

Plants For a Future 2021CE

Hardiness Zone 3, Acidic, Sandy Soil, Edibility 4/5+

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1 Introduction

This is a book of plant information harvested from pfaf.org the goal is for future generations to have access to this valuable plant information. This book does Not contain any plant identification material, so you will need to use other references for actually identifying the plant. This book does contain information on how to grow the plants and their edible and other uses.

The plants are sorted by nitrogen-fixing ability, edibility, plant height, other uses, medicinal uses, and latin name. They start with nitrogen fixers because those are typically the easiest to establish pioneer plants.

Instructions for food forest design are in separate books. But basic idea is to have thorny plants on the border as a form of fence to keep out predators and animals that want to raid your food forest, with the shortest plants closest to the border, then gradually getting taller plants as you go in. For example starting with thorny herbacious, then row of thorny shrub, the row of thorny trees. Afterwards can put in several rows of your staple crop, which typically is a variety of nut, acorn and bean producing tall trees. Then can put in a long rotation coppice of hardwood lumber trees you find useful, then a row or more of fruit trees, then a short rotation coppice to use for firewood, then some rows of berry, bean and nut shrubs, with the closest circle near the community being vegetables and perennials that take more care than the others.

You need about a hectare of land (2.5 acres) per person if you have 6 months growing season (where average temperature is above 10C), at least half of which should be dedicated to food, the other half can be to lumber, but can also be food trees that are occasionally used as lumber. A general formula is 6/monthsGrowingSeason to see how many hectares you need. This assumes you have at least 600mm

of rainfall per year, and only works if you have more than 3 months growing season, as very little you can grow in less than that.

If you live in a dry area, especially one prone to flash floods, then it is imperative that you spend your dry season digging swales and vernal pools, that will collect the rain water during the flash floods and keep it in place so that it enters the ground, then you can grow things downhill of your vernal pools and swales. It is generally more important that they be extensive than deep. You want to ideally catch every drop, so that none of it leaves your property.

By contrast if you live in a very wet area with more than enough water, then you want to have ditches to help the water leave the property and not waterlog your soil.

If you have a slope exceeding 30 degrees then you will want to reinforce with terraces any water catchment areas such as vernal pools or ponds, also can use terraces for growing tubers or anything that requires digging to plant or harvest, otherwise your soil is liable to wash away. You may wish to use terraces with smaller slopes as well if you are doing soil tilling or digging. In a food forest permaculture system generally you want to minimize soil disturbance and focus on getting your food from fruits, leaves, bark or other above ground sources.

In a medium wetness area you can use either method to create various microclimates for different kinds of plants.

In either case you want to start with about 1 in three plants being a nitrogen fixer (bwon), as it will help your food forest grow faster.

Summaries are given in the Cosmic Language (KsomPyash). Long descriptions are in English.

1.1 Pronunciation guide

a /a/, b /b/, c /j/ "sh", d /d/, e /e/, f /f/, g /g/, h /h/, i /i/, j /j/ "zh", k /k/, l /l/, m /m/, n /n/, o /o/, p /p/, q /ŋ/ "ng", r /r/, s /s/, t /t/, u /u/, v /v/, w /w/, x /x/ /ʒ/ "gh", y /j/, z /z/, 2 /j/ (low tone), 6 /ə/ "uh", 7 /ʌ/ (high tone).

1.2 vocabulary

tlin /tlin/ cold hardiness, cyuc /tju/ heat hardiness, kcak /kʃak/ food (rating), tcan /tʃan/ other (uses rating), dwat /dwat/ medicinal (rating), hkuc /hku/ (adult) height, hsi2n /hsi.ɪn/ (adult) width, ksan /ksan/ least (minimum).

pcim /pʃim/ full (shade), hmim /hmim/ medium (shade), htut /htut/ no (shade), cyut /tjut/ shade. li /li/ realis-mood (end of sentence). ta /ta/ topic-case.

hgat /hgat/ drought (tolerant), kyuc /kju/ dry, tcup /tʃup/ damp, hja7n /hʒa.ɪn/ wet, hs6s /hsəs/ puddle, hwic /hwɪ/ water (requirement).

hyis /hjis/ poor (soil), hras /hras/ sandy, jlut /ʒlut/ loamy, nyik /njik/ mud (silt/clay loam), frip /frip/ pottery (heavy clay), hpa7t /hpa.ɪt/ topsoil.

frus /frus/ corrosive (very acid), flat /flat/ acid, prik /prik/ passive (neutral), lwis /lwɪs/ alkaline, slip /slip/ slippery (very alkaline), hsom /hsom/ salt (saline), hpa7tmwat /hpa.ɪtmwat/ topsoil taste.

fyim /fjif/ self (fertile), xre7t /rge1t/, nyanhjen /jjanh3en/ male-female (dioecious, distinct male and female plants), hjon /h3on/ sex.

hmuc /hmuf/ purpose, pcis /pjis/ danger, trot /trot/ temperature, prop /prop/ fertile, tcan /tjan/ other, hyum /hjum/ uses, dwat /dwat/ medicine, drut /drut/ description, kcec /kje/ region, tfo2n /tfo1n/ nitrogen-fixing, xlutkfam /xlut.kfam/ plant quantity, bwon /bwon/ bean, mran /mran/ corn/grain non-nitrogen-fixing plant, nrak /nrak/ continent (of origin), ksac /ksa/ circumstances/habitat.

5 hmuctrotkcec, tcup hmuchwic, 4 ksankcak, hras hmuchpa7t, flat hmuchpa7tmwat, 310 xlutkfam.

2 1 tlin

2.0.1 Pinus cembra sibirica

Siberian Pine

1 tlin 6 cyuc 4 kcak 3 tcan 2 dwat 30 m hkuc htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli flatprik hpa7tmwatli dyat hjonli

drutta Pinus cembra sibirica is an evergreen Tree growing to 30 m (98ft 5in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 1. It is in leaf all year, in flower from May to June, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].

kcaakta Edible Parts: Oil Seed Edible Uses: Condiment Oil Seed - raw or cooked[1, 2, 4, 34, 177, 183]. An important local food source in Siberia and China[81], the oil-rich seed has a delicious flavour with a slight taste of turpentine. A reasonable size, it is about 10mm x 8 mm[200]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200]. Carbon Farming - Staple Crop: protein-oil.

tcanta Dye Herbicide Oil Wood A tan or green dye is obtained from the needles[168]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. Turpentine is obtained from the leaves[46, 61]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. Wood - soft, easily worked. The timber is used for construction, furniture, turnery etc[46, 61, 100].

dwatta The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge[4]. It is a valuable remedy used internally in the treatment of kidney and bladder complaints and is used both internally and as a rub and steam bath in the treatment of rheumatic affections[4]. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and TB[4]. Externally it is a very beneficial treatment for a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers[4].

nrakta E. Asia - Siberia to China. ksacta Wet situations[81]. Mountains, river basins; 800-2400 m. Heilongjiang (Tuqiang), Nei Mongol, Xinjiang (Kazakstan, Mongolia, E Russia)[266].

propta It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed[80]. Plant seedlings out into their permanent positions as soon as possible and protect them for their first winter or two[11]. Plants have a very sparse root system and the sooner they are planted into their permanent positions the better they will grow[K]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm[200]. We actually plant them out when they are about 5 - 10cm tall. So long as they are given a very good weed-excluding mulch they establish very well[K]. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Cuttings. This method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

nwatta Management: Standard Minor Global Crop Staple Crop: Protein-oil Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1] - this report conflicts with the plants reported natural habitat of wet soils[81, K]. Established plants tolerate drought[200]. Plants are slow growing in cultivation[81]. Leaf secretions inhibit the germination of seeds, thereby inhibiting the growth of other plants below the tree[18]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. The cones do not open, seed is extracted by breaking up the soft scales of the cone[200]. This plant is seen as a distinct species by some botanists, differing from *P. cembra* in its larger cones and by having 3 resin canals instead of one in each leaf[200]. Plants in this genus are notably susceptible to honey fungus[200]. Climate: boreal to warm temperate. Humidity: semi-arid to humid. Trees can live for 500 years. One tree can yield 1,000-1,500 cones in a year. Each cone contains 80-140 seeds. Seeds take 2 years to ripen. Carbon farming - Cultivation: minor global crop. Management: standard. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. An evergreen. The root pattern is a tap root similar to a carrot going directly down [1-2].

3 2 tlin

3.1 bwon

3.1.1 Caragana arborescens

Siberian Pea Tree, Siberian peashrub

tfo2n 2 tlin 7 cyuc 5 kcak 4 tcan 1 dwat 6 m hkuc htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

drutta *Caragana arborescens* is a deciduous Shrub growing to 6 m (19ft) by 4 m (13ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower in May, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista Reports that this plant contains toxins have not been substantiated[65]. The occurrence of cystine in the seeds is doubtful[65].

kcaakta Edible Parts: Oil Seed Seedpod Edible Uses: Oil Seed - cooked[2, 105]. Small but produced in abundance[11], there are 4 - 6 seeds per pod[202]. A bland flavour, it is best used in spicy dishes[183]. The raw seed has a mild pea-like flavour, though we are not sure if it should

be eaten in quantity when raw[K]. The seed contains 12.4% of a fatty oil and up to 36% protein[183, 269], it has been recommended as an emergency food for humans[65]. More than just an emergency food, this species has the potential to become a staple crop in areas with continental climates[K]. Young pods - cooked and used as a vegetable[46, 61, 105, 177, 183, 269].

tcanta Companion Dye Fibre Hedge Hedge Oil Shelterbelt Soil stabilization A fibre obtained from the bark is used for making cordage[46, 61, 74, 269]. A blue dye is obtained from the leaves[74, 269]. The seed contains 12.4% of a fatty oil[74]. The plant can be grown as a hedge[160]. It is quite wind-resistant and can also be planted in a shelterbelt[200]. The plant has an extensive root system and can be used for erosion control, especially on marginal land[160]. Because of its nitrogen-fixing capacity, it is valued as a soil-improving plant[269].

dwatta Cancer Emmenagogue The whole plant, known as ning tiao, is used in the treatment of cancer of the breast, and the orifice to the womb, and for dysmenorrhoea and other gynaecological problems[269].

nrakta E. Asia - Siberia to Mongolia. Occasionally naturalized in Europe in France[50]. ksacta River banks, pebbles, sands, open forests and forest edges, gully slopes and stony slopes[74].

propta Seed - best sown as soon as it is ripe in a cold frame[200]. It usually germinates in 2 weeks[K]. Stored seed should be pre-soaked for 24 hours in warm water then sown in a cold frame[78, 113, 200]. If the seed has not swollen then scarify it and re-soak for another 12 hours before sowing[138]. Germination usually takes place within 2 - 3 weeks at 20°C[138]. Good percentage[11]. As soon as they are large enough to handle, prick the seedlings out into individual pots and grow them on in a greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. There are approximately 40,000 seeds per kilo[269]. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame[113]. Layering in spring.

nwatta Agroforestry Services: Living fence Agroforestry Services: Nitrogen Agroforestry Services: Windbreak Industrial Crop: Biomass Management: Coppice Management: Standard Minor Global Crop Staple Crop: Protein Succeeds in most well-drained soils, preferring full sun and a light sandy dry or well-drained soil[1, 11, 200]. Tolerates very alkaline soils[202]. Plants do not require a rich soil[1, 11, 108], succeeding on marginal land[160]. Established plants are drought resistant[160]. Fast growing[188]. Dormant plants are hardy to about -30°C[184], they prefer a continental climate and do not grow so well in areas that do not have very cold winters[200]. They grow and fruit very well in the eastern half of the country, even in northern areas, though they do not do so well in the wetter west[K]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. The Siberian pea shrub has an excellent potential to become a staple food crop. The seed is nutritious and wholesome, although rather small it is often very freely borne and is easily harvested[K]. This species has also been recommended as a nitrogen-fixing windbreak and ground cover plant that binds the soil and produces fibre and dye stuffs[218]. C. boissii and C. fruticosa are closely related to this species[182] and can probably be used similarly[K]. A very ornamental plant, some named forms have been developed for their ornamental value[182]. 'Nana' is a very compact dwarf form[183] that grows slowly[11]. 'Pendula' has stiffly pendent branches but is otherwise the same as the type species[11]. A good bee plant[74]. Plants in this genus are notably resistant to honey fungus[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or

more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2].

3.1.2 *Elaeagnus angustifolia*

Oleaster, Russian olive
tfo2n 2 tlin 7 cyuc 4 kcak 2 tcan 2 dwat 7 m hkuc
htut cyutli hgatykucup hwicli hyhshrasjlutnyik hpa7tli flat-prikwiwsliphom hpa7tmwatli xre7t hjonli

drutta *Elaeagnus angustifolia* is a deciduous Shrub growing to 7 m (23ft) by 7 m (23ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

kcakta Edible Parts: Fruit Seed Edible Uses: Gum Fruit - raw or cooked as a seasoning in soups[1, 2, 3, 100, 146, 74]. Dry, sweet and mealy[11, 145, 183]. The fruit can also be made into jellies or sherbets[183]. The fruit must be fully ripe before it can be enjoyed raw, if even slightly under-ripe it will be quite astringent[K]. The oval fruit is about 10mm long[200] and contains a single large seed[K]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous[K].

tcanta Companion Essential Fodder Fuel Gum Hedge Hedge Wood Plants can be grown as a hedge in exposed positions[29], tolerating maritime exposure[200]. It is fairly fast-growing and very tolerant of pruning, but is rather open in habit and does not form a dense screen[K]. Because the plant fixes atmospheric nitrogen, it makes a hedge that enriches the soil rather than depriving it of nutrients[K]. An essential oil obtained from the flowers is used in perfumery[74]. A gum from the plant is used in the textile industry in calico printing[74]. Wood - hard, fine-grained. Used for posts, beams, domestic items[74, 100], it is also much used for carving[245]. The wood is an excellent fuel[74, 146].

dwatta Cancer Febrifuge Pectoral The oil from the seeds is used with syrup as an electuary in the treatment of catarrh and bronchial affections[240]. The juice of the flowers has been used in the treatment of malignant fevers[240]. The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta Europe to W. Asia, extending as far north as latitude 55° in Russia. ksacta By streams and along river banks to 3000 metres in Turkey[93].

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate in late winter or early spring, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pot as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Difficult[113]. Cuttings of mature wood of the current year's growth, 10 - 12cm with a heel, October/November in a frame[200]. The cuttings are rather slow and difficult to root, leave them for 12 months[113]. Layering in September/October. Takes 12 months[78]. Root cuttings in the winter[200].

nwatta Agroforestry Services: Nitrogen Agroforestry Services: Windbreak Fodder: Bank Industrial Crop:

Biome Management: Coppice Management: Coppice Management: Standard Minor Global CropLandscape Uses:Screen, Specimen. An easily grown plant, it succeeds in most soils that are well-drained[200], though it dislikes shallow chalk soils[98]. Prefers a light sandy soil that is only moderately fertile[11], succeeding in poor soils and dry soils[11, 200]. Requires a position in full sun, growing very well in hot dry positions[182]. Plants are very drought and wind resistant[1, 166, 200], they tolerate conditions of considerable salinity and alkalinity[227]. A very hardy plant, tolerating temperatures down to about -40°C[184]. However, plants prefer a continental climate[49] and are apt to be cut back in severe winters in Britain because the summer is often not warm enough to have fully ripened the wood[1]. A very variable species[214]. This species is often cultivated in N. Europe for its edible fruits, there are many named varieties and some of these are thornless[214]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[160, 200]. An excellent companion plant, when grown in orchards it can increase yields from the fruit trees by up to 10%. Plants are very tolerant of pruning, they usually resprout freely even when cut right back to the ground. This species is notably resistant to honey fungus[88, 200]. The flowers are sweetly and heavily scented[184]. Special Features: Attractive foliage, Not North American native, Invasive, Naturalizing, Fragrant flowers, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fleshy. Thick or swollen - fibrous or tap root [2-1].

3.1.3 Caragana boissii

Siberian peatree
tfo2n 2 tlin 9 cyuc 4 kcak 4 tcan 0 dwat 2 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjlut hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli
drutta Caragana boissii is a deciduous Shrub growing to 2 m (6ft) by 1.5 m (5ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower in May, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.
pcista The following report belongs to the closely related C. arborescens. Reports that this plant contains toxins have not been substantiated[65]. The occurrence of cystine in the seeds is doubtful[65].
kcka Edible Parts: Oil Seed SeedpodEdible Uses: OilThe following uses are for the closely related C. arborescens and can probably also be applied to this species[K]. Seed - cooked[2, 105]. Small but produced in abundance[11], there are 4 - 6 seeds per pod[202]. A bland flavour, it is best used in spicy dishes[183]. The raw seed has a mild pea-like flavour, though we are not sure if it should be eaten in quantity when raw[K]. The seed contains 12.4% of a fatty oil and up to 36% protein[183], it has been recommended as an emergency food for humans[65]. Young pods - cooked and used as a vegetable[46, 61, 105, 177, 183].
tcanta Dye Fibre Hedge Hedge Oil Shelterbelt Soil stabilizationThe following uses are for the closely related C. arborescens and can probably also be applied to this

species[K]. A fibre is obtained from the bark, used for cordage[46, 61, 74]. A blue dye is obtained from the leaves[74]. The seed contains 12.4% of a fatty oil[74]. The plant can be grown as a hedge[160]. It is quite wind-resistant and can also be planted in a shelterbelt[200]. The plant has an extensive root system and can be used for erosion control, especially on marginal land[160].

nrakta E. Asia - China. ksacta Not known
propta Seed - best sown as soon as it is ripe in a cold frame[200]. It usually germinates in 2 weeks[K]. Stored seed should be pre-soaked for 24 hours in warm water then sown in a cold frame[78, 113, 200]. If the seed has not swollen then scarify it and re-soak for another 12 hours before sowing[138]. Germination usually takes place within 2 - 3 weeks at 20°C[138]. Good percentage[11]. As soon as they are large enough to handle, prick the seedlings out into individual pots and grow them on in a greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame[113]. Layering in spring.

nwatta Succeeds in most well-drained soils, preferring full sun and a light sandy dry or well-drained soil[1, 11, 200]. Tolerates very alkaline soils[202]. Does not require a rich soil[1, 11, 108], succeeding on marginal land[160]. Established plants are drought resistant[160]. Fast growing[188]. This species is hardy to at least -30°C[184], it prefers a continental climate with hot summers and cold winters so it does not grow so well in the milder western half of Britain[200]. This species is closely related to C. arborescens, differing in the longer teeth of the calyx and in the downy ovary and young fruit[11]. It can probably be used in all the ways C. arborescens is used and therefore has an excellent potential for human food.[K]. A good bee plant[74]. Plants in this genus are notably resistant to honey fungus[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200].

3.2 mran

3.2.1 Rubus arcticus

Arctic Bramble, Arctic raspberry, Dwarf raspberry
2 tlin 7 cyuc 5 kcak 1 tcan 0 dwat 0.2 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikliwis hpa7tmwatli xre7t hjonli
drutta Rubus arcticus is a PERENNIAL growing to 0.2 m (0ft 8in) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 1. It is in flower from June to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It cannot grow in the shade. It prefers moist soil.
kcka Edible Parts: Flowers FruitEdible Uses: TeaFruit - raw or cooked[2, 61, 105, 257]. Very sweet, juicy and palatable with a pineapple-like aroma[1, 101, 172, 183]. Delicious when eaten out of hand, they are also used in making cakes, jams etc[183]. Unfortunately, they are often not produced very prolifically in a garden situation in Britain, probably because they prefer colder winters. Flowers - raw. Sweet and delicious[172]. The fresh or dried leaves are used as a tea substitute[61, 105, 183].
tcanta DyeA purple to dull blue dye is obtained from the fruit[168].
nrakta Northern N. America, N. Europe and N. Asia. Formerly native to Britain in the Scottish highlands[17] ksacta Damp peats or gravels, especially on calcareous soils[43].
propta Seed - requires stratification and is best sown in early autumn in a cold frame. Stored seed requires one month stratification at about 3°C and is best sown as early as possible in the year. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Division in early spring or just before leaf-fall

in the autumn[200]. Larger divisions can be planted out directly into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

rwatta Easily grown in a good well-drained loamy soil in a sunny position[1, 11]. A very variable species, it is sometimes divided into three species, viz.: - *R. arcticus*, *R. acaulis* and *R. stellatus*[101]. Suitable for growing in containers. Most often in acidic soils rich in organic matter. *Rubus arcticus* subsp. *x stellarcticus* G.Larss. is an unresolved name

This name is unresolved, but some data suggest that it is synonymous with *Rubus x stellarcticus* (G.Larss.) H.E.Weber, but some data suggest that it is an infraspecific name of *Rubus arcticus* L..

3.2.2 Zea mays

Sweet Corn, Corn

2 tlin 11 cyuc 5 kca3 3 tcan 3 dwat m hkuc

htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik hpa7tmwatli hjonli

drutta *Zea mays* is an ANNUAL growing to 2 m (6ft 7in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3 and is frost tender. It is in flower from July to October, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Oil Oil Pollen Seed Stem Edible Uses: Coffee Oil Oil Seed - raw or cooked. Corn is one of the most commonly grown foods in the world. The seed can be eaten raw or cooked before it is fully ripe[1, 2, 33, 34] and there are varieties especially developed for this purpose (the sweet corns) that have very sweet seeds and are delicious[183, K]. The mature seed can be dried and used whole or ground into a flour. It has a very mild flavour and is used especially as a thickening agent in foods such as custards[183]. The starch is often extracted from the grain and used in making confectionery, noodles etc[183]. The dried seed of certain varieties can be heated in an oven when they burst to make 'Popcorn'[183]. The seed can also be sprouted and used in making uncooked breads and cereals[183]. A nutritional analysis is available[218]. The fresh succulent 'silks' (the flowering parts of the cob) can also be eaten[55, 183]. An edible oil is obtained from the seed, it is an all-purpose culinary oil that is frequently used as a food in salads and for cooking purposes[13, 46, 183, 238]. The pollen is used as an ingredient of soups[183]. Rich in protein, it is harvested by tapping the flowering heads over a flat surface such as a bowl. Harvesting the pollen will actually help to improve fertilisation of the seeds[K]. The roasted seed is a coffee substitute[183]. The pith of the stem is chewed like sugar cane and is sometimes made into a syrup[183].

tcanta Adhesive Fuel Oil Oil Packing Paper A glue is made from the starch in the seed[13]. This starch is also used in cosmetics and the manufacture of glucose[61]. A semi-drying oil is obtained from the seed[57]. It has many industrial uses, in the manufacture of linoleum, paints, varnishes, soaps etc[21, 61]. The corn spathes are used in the production of paper, straw hats and small articles such as little baskets[74, 171]. A fibre obtained from the stems and seed husks is used for making paper[189]. They are harvested in late summer after the seed has been harvested, they are cut into usable pieces and soaked in clear water for 24 hours. They are then cooked for 2 hours in soda ash and then beaten in a ball mill for 1½ hours in a ball mill. The fibres make a light greenish cream paper[189]. Be careful not to overcook the fibre otherwise it will produce a sticky pulp that is very hard to form into paper[189]. The dried cobs are used as a fuel[171]. The pith of the stems is used as a packing material[171].

dwatta Cancer Chologogue Demulcent Diuretic Hypoglycaemic Hypotensive Lithotropic Stimulant Vasodilator Warts A decoction of the leaves and roots is used in the treatment of strangury, dysuria and gravel[218]. The corn silks are chologogue, demulcent, diuretic, lithotropic, mildly stimulant and vasodilator[4, 9, 165, 176, 218]. They also act

to reduce blood sugar levels and so are used in the treatment of diabetes mellitus[9, 218] as well as cystitis, gonorrhoea, gout etc[222]. The silks are harvested before pollination occurs and are best used when fresh because they tend to lose their diuretic effect when stored and also become purgative[9]. A decoction of the cob is used in the treatment of nose bleeds and menorrhagia[218]. The seed is diuretic and a mild stimulant[4]. It is a good emollient poultice for ulcers, swellings and rheumatic pains[4], and is widely used in the treatment of cancer, tumours and warts[218]. It contains the cell-proliferant and wound-healing substance allantoin, which is widely used in herbal medicine (especially from the herb comfrey, *Symphytum officinale*) to speed the healing process[222]. The plant is said to have anticancer properties and is experimentally hypoglycaemic and hypotensive[218].

nrakta Original habitat is obscure, probably S. America or Mexico. **ksacta** Not known in the wild.

propta Seed - sow April in individual pots in a greenhouse. Grow on quickly and plant out after the last expected frosts. A direct outdoor sowing, especially of some of the less sweet varieties, can be tried in May.

rwatta Requires a warm position a well drained soil and ample moisture in the growing season[16, 33]. Prefers a pH in the range 5.5 to 6.8[200]. Requires a rich soil if it is to do well[201]. Corn is widely cultivated for its edible seed, especially in tropical and warm temperate zones of the world[200], there are many named varieties[132]. Unfortunately, the plant is not frost tolerant and so needs to be started off under glass in Britain if a reasonable crop is to be grown. There are five main types:- Sweetcorn is of fairly recent development. It has very sweet, soft-skinned grains that can be eaten raw or cooked before they are fully ripe. Cultivars have been developed that can produce a worthwhile crop even in the more northerly latitudes of Britain if a suitable warm sunny sheltered site is chosen[238, K]. Popcorn is a primitive form with hard-skinned grains. When roasted, these grains 'explode' to form the popular snack 'popcorn'[238]. Waxy corn is used mainly in the Far East. It has a tapioca-like starch[238]. Flint corn, which shrinks on drying, can have white, yellow, purple, red or blue-black grains[238]. It is not so sweet and also takes longer to mature so is a problematic crop in Britain. There are many other uses for this plant as detailed below. Dent corn has mostly white to yellow grains. This and Flint corn are widely grown for oils, cornflour, cereals and silage crops. Corn grows well with early potatoes, legumes, dill, cucurbits and sunflowers[18, 20, 201], it dislikes growing with tomatoes[20]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fibrous dividing into a large number of fine roots [2-1].

3.2.3 Cucurbita moschata

Squash, Crookneck squash

2 tlin 11 cyuc 5 kca3 1 tcan 3 dwat m hkuc

hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis hpa7tmwatli fyif hjonli

drutta *Cucurbita moschata* is an ANNUAL CLIMBER growing to 0.6 m (2ft) by 4 m (13ft 1in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3 and is frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The sprouting seed produces a toxic substance in its embryo[65].

kcakta Edible Parts: Flowers Fruit Leaves Oil Seed Edible Uses: Oil Fruit - cooked[2, 27, 46, 105]. Some cultivars have a delicious flavour when baked, rather like a sweet potato[K]. The flesh can be dried and ground into a powder then used in making breads etc[183]. Some varieties can be stored for up to 9 months. Seed - raw or cooked[57, 86, 105]. Rich in oil with a pleasant nutty flavour[183] but very fiddly to use because the seed is small and covered with a fibrous

coat[K]. An edible oil is obtained from the seed[183]. Leaves and young stems - cooked and used as a potherb or added to soups, stews etc[105, 135, 183]. Flowers - cooked[105, 135, 183].

tcanta OilAn edible oil is obtained from the seed[183].
dwatta Anthelmintic GalactogogueThe seed is vermifuge[147]. It is eaten fresh or roasted for the relief of abdominal cramps and distension due to intestinal worms[218]. About 800 peeled seeds is said to make a safe and effective treatment for tape worm[218]. They are ground into a fine flour, then made into an emulsion with water and eaten. It is then necessary to take a purge in order to expel the tapeworms or other parasites from the body[7]. The boiled root is galactogogue[218].

nrakta Origin is obscure. ksacta Not known in the wild.
propta Seed - sow early to mid spring in a greenhouse in a rich soil. Germination should take place within 2 weeks. Sow 2 or 3 seeds per pot and thin out to the best plant. Grow them on fast and plant out after the last expected frosts, giving them cloche or frame protection for at least their first few weeks if you are trying them outdoors.

nwatta Requires a rich, well-drained moisture retentive soil and a very warm, sunny and sheltered position[1, 37, 86]. Prefers a pH of 5.5 to 5.9, but tolerates up to 6.8[86]. Moderate rainfall favours growth, but the roots of most cultivars are sensitive to high soil-water levels[200]. The squash is a frost-tender annual plant that is widely cultivated, especially in warm temperate and tropical areas, for its edible fruit[27]. There are very many named varieties widely differing in size shape and taste[27, 183]. Some varieties are used in the summer and autumn whilst others are harvested in the autumn and can be stored for several months. Succeeds outdoors most years in Britain[27]. Plants are more suited to warmer climates than Britain[200] and are only really successful in good summers in this country, they do not do well in the north[86]. Most cultivars are day-length neutral[200]. This species only hybridizes with other members of the genus under controlled conditions[86, 135]. Grows well with sweetcorn, radishes and nasturtium but dislikes potatoes[18, 20]. Squashes and pumpkins can be differentiated from each other by their fruit stalk, it is angular and polygonal in pumpkins but thick, soft and round in squashes[132].

3.2.4 Brassica oleracea italica

Broccoli
2 tlin 11 cyuc 5 kcak 2 tcan 0 dwat 0.9 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwlati fyixre7t hjonli

drutta Brassica oleracea italica is a BIENNIAL growing to 0.9 m (3ft). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

kcakta Edible Parts: Flowers Leaves Edible Uses: Young flowering stems and leaves - raw or cooked[33, 46]. The shoots of sprouting broccoli are harvested when about 10cm long, and before the flowers open, the shoots look somewhat like a small white or purple cauliflower and have a delicious flavour[K]. They are considered to be a gourmet vegetable. When picking the stems, make sure that you leave behind a section of the stem with leaves on it, since the plants will often produce new side shoots from the leaf axils[K]. Calabrese and Romanesco plants produce a central inflorescence rather like a small cauliflower, which are sometimes followed by a number of smaller flowering shoots. They usually come into bearing in the late summer or autumn and are very productive if they are regularly harvested. Sprouting broccoli plants come into production in late winter to early spring and can be very heavy bearing over a period of two months or more so long as all the flowering stems are harvested before coming into flower.

tcanta CompanionA good companion for celery and other aromatic plants since these seem to reduce insect predations[18, 20]. Grows badly with potatoes, beet and

onions[20]. Grows well with potatoes, beet and onions according to another report[201].

nrakta A cultivated form of *B. oleracea*. ksacta Not known in the wild.

propta Seed - sow sprouting broccoli in a seedbed outdoors in March to May. Plant out in June. Do not let the seedlings get overcrowded or they will soon become leggy and will not make such good plants. If your seedlings do get leggy, it is possible to plant them rather deeper into the soil - the buried stems will soon form roots and the plant will be better supported. Romanesco and calabrese are often sown in situ in the spring.

nwatta Succeeds in full sun in a well-drained fertile preferably alkaline soil[16, 200]. Tolerates a pH in the range 4.3 to 8.3. Prefers a heavy soil[16]. Succeeds in any reasonable soil[33]. Succeeds in maritime gardens[200]. Some forms are very cold-hardy, tolerating temperatures down to about -17°C[200]. Broccoli is closely related to the cauliflowers (*C. oleracea botrytis*) and is often grown for its edible young flowering stems which, by careful selection of varieties, can be available almost all year round from early summer right round to late spring. There are many named varieties and these can be classified into three main groups:- Calabrese, which matures in summer and autumn, is the least cold-hardy form. It produces green, or sometimes purple, flowering heads[264]. Some forms will produce a number of side shoots once the main head has been harvested, though other forms seem unable to do this[264]. Romanesco matures in late summer and the autumn. It has numerous yellowish-green conical groups of buds arranged in spirals[264]. Given a little protection from the cold, it is possible to produce a crop throughout the winter. Unlike the other types of broccoli, romanesco seems unable to produce side shoots once the main head has been harvested[264]. Sprouting broccoli is the most cold-hardy group. It does not form a central head like the other two groups but instead produces a mass of side shoots from early spring until early summer. The more you harvest these shoots, especially if you do so before the flowers open, then the more shoots the plant produces[K]. A good companion for celery and other aromatic plants since these seem to reduce insect predations[18, 20]. Grows badly with potatoes, beet and onions[20]. Grows well with potatoes, beet and onions according to another report[201].

3.2.5 Cucurbita maxima

Winter Squash
2 tlin 11 cyuc 5 kcak 2 tcan 3 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwlati fyir hjonli

drutta Cucurbita maxima is an ANNUAL CLIMBER growing to 0.6 m (2ft) by 5 m (16ft 5in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3 and is frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The sprouting seed produces a toxic substance in its embryo[65].

kcakta Edible Parts: Flowers Fruit Leaves Oil Oil Seed Edible Uses: Oil Oil Fruit - cooked[2, 27, 46, 97]. A delicious flavour when baked, rather like a sweet potato[K]. The flesh can be dried, ground into a powder and used with cereals in making bread, cakes etc[7, 183]. Some varieties can be stored for up to 9 months. Seed - raw or cooked[7, 57, 183]. Rich in oil with a very pleasant nutty flavour but very fiddly to use because the seed is small and covered with a fibrous coat[K]. The seed can also be ground into a powder and used with cereals in making breads etc[183]. An oil is obtained from the seed[21, 86]. Young flowers - raw or cooked[7, 135, 183]. They are often dipped in batter and fried. Young leaves and stems - cooked[135, 183]. The leaves contain up to 5% protein[183].

tcanta Cosmetic Oil OilThe seed contains 34 - 54% of a semi-drying oil[61, 86]. Used for lighting[21]. A nourishing

face-mask can be made from the fruit that is effective for dry skins[7].

dwatta Diuretic Nervine Poultice VermifugeThe seeds are diuretic, tonic and vermifuge[7, 88, 240]. The complete seed, together with the husk, is used as a vermifuge. This is ground into a fine flour, then made into an emulsion with water and eaten. It is then necessary to take a purgative afterwards in order to expel the tapeworms or other parasites from the body[7]. As a remedy for internal parasites, the seeds are less potent than the root of *Dryopteris felix-mas*, but they are safer for pregnant women, debilitated patients and children[238]. The oil from the seed is used as a nerve tonic[240]. The fruit pulp is used as a soothing poultice on burns, inflammations and boils[240].

nrakta Origin is obscure, possibly derived in cultivation from *C. andreana*. ksacta Not known in the wild.

propta Seed - sow early to mid spring in a greenhouse in a rich soil. Germination should take place within 2 weeks. Sow 2 or 3 seeds per pot and thin out to the best plant. Grow them on fast and plant out after the last expected frosts, giving them cloche or frame protection for at least their first few weeks if you are trying them outdoors.

nwatta Requires a rich, well-drained moisture retentive soil and a very warm, sunny and sheltered position[37, 86]. Prefers a pH of 5.5 to 5.9, but tolerates up to 6.8[86]. Dry periods with a relatively low humidity favour the best growth[200]. A frost-tender annual plant, it is widely cultivated in tropical and temperate zones for its edible fruit, there are very many named varieties differing considerably in their fruits[183]. Most of the winter squashes derive from this species, including Hubbard, Butternut, Acorn, Argentine and Boston[86]. Many forms require a temperature range of 20 - 27°C during the growing season, but there are some forms that tolerate cooler conditions and these succeed outdoors most years in Britain[200, K]. Most cultivars are relatively insensitive to day-length[200]. Squashes and pumpkins can be differentiated from each other by their fruit stalk, it is angular and polygonal in pumpkins but thick, soft and round in squashes[132]. This species hybridizes readily with *C. andreana* but can only be crossed with other species under controlled conditions[86, 135]. Some modern works see *C. andreana* as being no more than a subspecies of this species, classifying it as *C. maxima andreana* (Naudin)Filov. Grows well with sweetcorn and thornapple but dislikes potatoes[18, 20].

3.2.6 *Viburnum lentago*

Sheepberry, Nannyberry, Nannyberry Viburnum
2 tlin 8 cyuc 4 kcak 0 tcan 1 dwat 9 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli dyatxre7t hjonli

drutta *Viburnum lentago* is a deciduous Tree growing to 9 m (29ft) by 5 m (16ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from May to June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[2, 3, 55, 62, 65, 257]. It can also be dried for winter use[55]. The fruit is variable in size and quality, the best being about 15mm long, pulpy, very sweet, somewhat juicy and pleasant tasting but with a thick skin and a single large seed[43, 82, 101, 159, 183]. The fruit is said to be best after a frost[102] but it is sometimes dry[159].

tcanta Hedge Hedge WoodThe plant is grown as a hedge in N. America[226]. Wood - heavy, hard, close grained, malodorous[82, 226]. Of no commercial value due to the small size of the trees[229].

dwatta Antispasmodic Diuretic EmmenagogueThe bark is antispasmodic[102]. A decoction of the roots has been used to treat irregular menstruation and the spitting of blood[257]. An infusion of the leaves has been used in the treatment of measles[257]. An infusion of the leaves has been drunk, or a poultice of leaves applied, in the treatment of dysuria[257].

nrakta Northern N. America - New Brunswick to Saskatchewan, south to Virginia and Nebraska ksacta Rich soils along woodland borders, edges of streams etc, it is also found on rocky hillsides etc[43, 82, 226].

propta Seed - best sown in a cold frame as soon as it is ripe. Germination can be slow, sometimes taking more than 18 months. If the seed is harvested 'green' (when it has fully developed but before it has fully ripened) and sown immediately in a cold frame, it should germinate in the spring[80]. Stored seed will require 2 months warm then 3 months cold stratification and can still take 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame or greenhouse. Plant out into their permanent positions in late spring or early summer of the following year. Cuttings of soft-wood, early summer in a frame[200]. Pot up into individual pots once they start to root and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood, 5 - 8 cm long with a heel if possible, July/August in a frame[78, 113]. Plant them into individual pots as soon as they start to root. These cuttings can be difficult to overwinter, it is best to keep them in a greenhouse or cold frame until the following spring before planting them out[113]. Cuttings of mature wood, winter in a frame. They should root in early spring - pot them up when large enough to handle and plant them out in the summer if sufficient new growth is made, otherwise keep them in a cold frame for the next winter and then plant them out in the spring. Layering of current seasons growth in July/August. Takes 15 months[78].

nwatta Landscape Uses:Border, Massing, Screen, Specimen. An easily grown plant, it succeeds in most soils but is ill-adapted for poor soils and for dry situations[1]. It prefers a deep rich loamy soil in sun or semi-shade[11, 200]. Best if given shade from the early morning sun in spring[200]. A very hardy plant, tolerating temperatures down to about -30°C[184]. A fast-growing but short-lived species in the wild[229]. It readily sprouts from the roots and forms thickets, a habit that is undesirable in small gardens[226]. The plants grow well, but do not usually fruit well in Britain[11, 200]. This is probably because they are self-incompatible and need to grow close to a genetically distinct plant in the same species in order to produce fruit and fertile seed[11, 200]. Special Features: North American native, Attracts butterflies, Attractive flowers or blooms. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2].

3.2.7 *Vaccinium australe*

Northern Blueberry
2 tlin 7 cyuc 4 kcak 2 tcan 1 dwat 1.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli frusflat
hpa7tmwatli dyat hjonli

drutta *Vaccinium australe* is a deciduous Shrub growing to 1.5 m (5ft) by 1.5 m (5ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2. The flowers are pollinated by Bees. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It cannot tolerate atmospheric pollution.

kcakta Fruit - raw or cooked[2, 3, 43, 62, 161]. It is usually sweet and juicy, though the flavour can be variable[11]. It can be used in pies, pastries, cereals, jellies etc[183]. The fruit can also be dried and used like raisins[183]. The fruit is rich in vitamin C[201]. The fruit is about 15mm in diameter[200]. A tea is made from the leaves and dried fruit[101].

tcanta A good bee plant. Acid soil. A purple dye can be made from the fruit and leaves. Landscape Uses: Border, Massing, Seashore. Special Features: Attracts birds and butterflies. Attractive flowers or blooms. Edible, wetlands plant.

dwatta Vitamin Cstringent, pectoral[201].
nrakta Introduced in Europe (Britain, The Netherlands), Asia (Japan), USA, Canada. ksacta Swamps, low wet woods, pine barrens and dry uplands[43].

propta Seed - sow late winter in a greenhouse in a lime-free potting mix and only just cover the seed[78]. Stored seed might require a period of up to 3 months cold stratification[113]. Another report says that it is best to sow the seed in a greenhouse as soon as it is ripe[200]. Once they are about 5cm tall, prick the seedlings out into individual pots and grow them on in a lightly shaded position in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of greenwood, May/June in a shady position in a compost that contains some peat[113]. Cuttings of half-ripe wood, 5 - 8cm with a heel, August in a frame[78]. Slow and difficult. Cuttings of mature wood, harvested in November and stored in a fridge then planted in a frame in March. Layering in late summer or early autumn[78]. Another report says that spring is the best time to layer[200]. Takes 18 months[78]. Division of suckers in spring or early autumn[113].

nwatta Blueberries: In warmer areas grow Southern Highbush and Rabbiteye (low chill) varieties while in cooler areas and areas that experience frost grow Northern Highbush (high chill) varieties. Requires a moist but freely-draining lime free soil, preferring one that is rich in peat or a light loamy soil with added leaf-mould[11, 200]. Prefers a very acid soil with a pH in the range of 4.5 to 6, plants soon become chlorotic when lime is present. Succeeds in full sun or light shade though it fruits better in a sunny position[200]. Requires shelter from strong winds[200]. Hardy to about -25°C[184]. Often cultivated for its edible fruit in America[183]. It usually blossoms freely in Britain[11]. Plants are at least partially self-sterile, more than one variety is required in order to obtain good yields of fruit[182]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. Leave the fruit on the shrub until the last minute, as the fruit is very acidic and will not ripen after being picked. Does not grow well with blackberries or raspberries[201]. Plants in this genus are notably resistant to honey fungus[200]. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

3.2.8 *Asparagus officinalis*

Asparagus, Garden asparagus
2 tlin 9 cyuc 4 kcaak 2 tcan 3 dwat 1.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlytnyik hpa7tli frusflatprikli-wisslipshom hpa7tmwatli nyanhjen hjonli

drutta *Asparagus officinalis* is a PERENNIAL growing to 1.5 m (5ft) by 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in August, and the seeds ripen from September to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Bees. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid, very alkaline and saline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

pcista Large quantities of the shoots can irritate the kidneys[20, 62]. The berries are mildly poisonous[163].

ksakta Edible Parts: Shoots Stem/Edible Uses: Coffee-yeung shoots - raw or cooked[2, 5, 15, 16, 27, K]. Considered a gourmet food[132], the shoots are harvested in the spring. We find them very acceptable raw in salads, with a hint of onion in their flavour[K]. They are normally boiled or steamed and used as a vegetable[K]. Male plants produce the best shoots[1]. Do not over-harvest the plant because this would weaken it in the following year. The shoots are a good source of protein and dietary fibre[201]. Roasted seeds are a coffee substitute[21, 46, 183].

tcanta InsecticideThe plant contains asparagusic acid, which has nematocidal properties[238].

dwatta Antibiotic Antispasmodic Aperient Cancer Cardiac Demulcent Diaphoretic Diuretic Laxative Sedative Tonic UrinaryAsparagus has been cultivated for over 2,000 years as a vegetable and medicinal herb[238]. Both the roots and the shoots can be used medicinally, they have a restorative and cleansing effect on the bowels, kidneys and liver[238]. The plant is antispasmodic, aperient, cardiac, demulcent, diaphoretic, diuretic, sedative and tonic[4, 21, 165, 201, 240]. The freshly expressed juice is used[4]. The root is diaphoretic, strongly diuretic and laxative[9, 218, 222]. An infusion is used in the treatment of jaundice and congestive torpor of the liver[240]. The strongly diuretic action of the roots make it useful in the treatment of a variety of urinary problems including cystitis[254]. It is also used in the treatment of cancer[218]. The roots are said to be able to lower blood pressure[7, 222]. The roots are harvested in late spring, after the shoots have been cut as a food crop, and are dried for later use[7]. The seeds possess antibiotic activity[222]. Another report says that the plant contains asparagusic acid which is nematocidal and is used in the treatment of schistosomiasis[238].

nrakta Western Europe, including Britain, from N. Germany to S. W. France. ksakta Fertile and sandy soils by the seashore and along river banks[9, 132].

propta Seed - pre-soak for 12 hours in warm water and then sow in spring or as soon as the seed is ripe in early autumn in a greenhouse. It usually germinates in 3 - 6 weeks at 25°C[134]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a sunny position in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer[K]. Division in early spring as the plant comes into growth.

nwatta Easily grown in any good garden soil[16]. Prefers a rich well-drained sandy loam and a sunny position[1, 16, 27, 238]. Prefers a pH of 6.5 or higher[200], though it tolerates a pH in the range 4.3 to 8.2. Asparagus is often cultivated as a luxury vegetable, there are some named varieties[16, 183]. Well-tended plants can be long-lived, an asparagus bed can last for well over 20 years. Asparagus is a good companion plant for tomatoes, parsley and basil[18, 20, 201]. When grown together, tomatoes help to protect asparagus from the asparagus beetle[201]. Asparagus is said to repel the nematodes that can infect tomatoes[201] (see the report below on the plants other uses). A good bee plant[108]. Dioecious. Male and female plants must be grown if seed is required. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

3.2.9 *Smilacina racemosa*

False Spikenard
2 tlin 8 cyuc 4 kcaak 2 tcan 2 dwat 1 m hkuc

pcimhhm cyutli tcup hwicli hras|lutnyik hpa7tli flatprikwis hpa7tmwatli fyifxre7t hjonli

drutta Smilacina racemosa is a PERENNIAL growing to 1 m (3ft 3in) by 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from May to June, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Fruit - raw, cooked or made into jellies and molasses[2, 46, 55, 85, 102, 183]. The fruit is smaller than a pea but is produced in quite large terminal clusters on the plant and so is easy to harvest. It has a delicious bitter-sweet flavour, suggesting bitter molasses[85, 183]. The fruit is said to store well[207], it certainly hangs well on the plants and we have picked very delicious fruits in late October[K]. Rich in vitamins[177], the fruit has been used to prevent scurvy[213]. Some caution is advised since the raw fruit is said to be laxative in large quantities, though this is only if you are not used to eating this fruit[85, 102, 159, 183]. Thorough cooking removes much of this laxative element[183]. Young leaves - raw or cooked[102]. The young shoots, as they emerge in spring, can be cooked and used as an asparagus substitute[55, 85, 102, 159, 183]. Root - cooked[85]. It should be soaked in alkaline water first to get rid of a disagreeable taste[85, 102, 159, 183]. It can be eaten like potatoes or pickled[183].

tcanta Plants can be grown as a ground cover when planted about 45cm apart each way[208].

dwatta False spikenard was widely employed by several native North American Indian tribes who used it to treat a variety of complaints[257]. It is little, if at all, used in modern herbalism. The plant is contraceptive and haemostatic[213, 257]. A decoction is used in the treatment of coughs and the spitting up of blood[257]. Half a cup of leaf tea drunk daily for a week by a woman is said to prevent conception[213, 257]. A poultice of the crushed fresh leaves is applied to bleeding cuts[257]. A tea made from the roots is drunk to regulate menstrual disorders[213]. The root is analgesic, antirheumatic, appetizer, blood purifier, cathartic and tonic[257]. A decoction is said to be a very strong medicine, it is used for treating rheumatism and kidney problems and, when taken several times a day it has been used successfully in treating cancer and heart complaints[257]. The fumes from a burning root have been inhaled to treat headaches and general body pain[257]. The fumes have also been used to restore an unconscious patient and to bring an insane person back to normal[257]. The dried powdered root has been used in treating wounds[213]. A poultice of the root has been applied to the severed umbilical cord of a child in order to speed the healing process and is also used to treat cuts, swellings etc[257]. A cold infusion of the root is used as a wash for sore eyes[257].

nrakta N. America - British Columbia to Nova Scotia, south to Georgia and Missouri. ksacta Moist coniferous and deciduous woods, clearings and bluffs[43, 60, 187], preferring shaded streamsides[159].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be very slow to germinate, often taking 18 months. Stored seed should be sown in a cold frame as soon as possible, it may take 2 years or longer to germinate. Grow the seedlings on in a shady part of a greenhouse for their first year without pricking them out, giving them liquid or foliar feeds as required to ensure that they do not become nutrient deficient. Divide the young plants up into individual pots in the autumn when they are dormant, and grow them on for at least another year in a shady part of the greenhouse. When the plants have reached a sufficient size, plant them out in the autumn whilst they are dormant. Division in spring or early autumn. Very easy, larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta An easy plant to grow[233], it requires a deep fertile humus rich moisture retentive soil, neutral to slightly acid, that does not dry out in the growing season, and a shady position[200]. Requires a lime-free soil[233]. It does well in a woodland garden[200]. Hardy to about -20°C[200]. Plants

take a few years to become established[208]. This species can be separated into two sub-species, *S. racemosa racemosa* being found in the east of the range whilst *S. racemosa amplexicaule* is found in the west[270]. One report says that the plant is apomictic (producing seeds without sexual fusion), though this needs to be investigated further[270]. The flowers have a gentle sweet perfume[245]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

3.2.10 Cucurbita pepo

Pumpkin, Field pumpkin, Ozark melon, Texas gourd
2 tlin 11 cyuc 4 kcak 2 tean 3 dwat 0.6 m hkuc
hmimhtut cyutli tcup hwicli hras|lutnyik hpa7tli flatprikwis hpa7tmwatli fyif hjonli

drutta Cucurbita pepo is an ANNUAL CLIMBER growing to 0.6 m (2ft) by 5 m (16ft 5in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3 and is frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The sprouting seed produces a toxic substance in its embryo[65].

kcakta Edible Parts: Flowers Fruit Leaves Oil Oil Root
Seed/Edible Uses: Oil Oil/Fruit - cooked[2, 27, 46, 105]. Used as a vegetable, it has a very mild flavour and is very watery[K]. It is often harvested when still very young when it is called courgettes. The fruit has very little flavour of its own and so is often used as a base for making savoury dishes, the seeds being scooped out of the fruit and a filling being put in its place - this can then be baked[K]. A nutritional analysis is available[218]. Seed - raw or cooked[57, 86, 183]. The seed can also be ground into a powder and mixed with cereals for making bread etc[183]. Rich in oil with a pleasant nutty flavour but very fiddly to use because the seed is small and covered with a fibrous coat[K]. A nutritional analysis is available[218]. The seeds can also be sprouted and used in salads etc[183]. Some caution is advised here, see notes above on toxicity. An edible oil is obtained from the seed[46, 105, 117, 183]. Leaves and young stems - cooked as a potherb[135, 183]. A nutritional analysis is available[218]. Flowers and flower buds - cooked or dried for later use[135, 183]. A nutritional analysis is available[218]. Root - cooked[179]. We have some doubts on this report[K].

tcanta Miscellany Oil Oil/The seed contains 34 - 54% of a semi-drying oil. Used for lighting[46].

dwatta Anthelmintic Miscellany Poultice Urinary/The pumpkin has been much used as a medicine in Central and North America. It is a gentle and safe remedy for a number of complaints, especially as an effective tapeworm remover for children and pregnant women for whom stronger acting and toxic remedies are unsuitable[254]. The seeds are mildly diuretic and vermifuge[7, 88, 254]. The complete seed, together with the husk, is used to remove tapeworms. The seed is ground into a fine flour, then made into an emulsion with water and eaten. It is then necessary to take a purgative afterwards in order to expel the tapeworms or other parasites from the body[7]. As a remedy for internal parasites, the seeds are less potent than the root of *Dryopteris felix-mas*, but they are safer for pregnant women, debilitated patients and children[238]. The seed is used to treat hypertrophy of the prostate[218]. The seed is high in zinc and has been used successfully in the early stages of prostate problems[254]. The diuretic action has been used in the treatment of nephritis and other problems of the urinary system[254]. The leaves are applied externally to burns[240]. The sap of the plant and the pulp of the fruit can also be used[254]. The fruit pulp is used as a decoction to relieve intestinal inflammation[254].

nrakta C. America? The origin is obscure[86]. ksacta Not known in the wild.

propta Seed - sow April in a greenhouse in a rich soil. Germination should take place within 2 weeks. Sow 2 or 3 seeds per pot and thin out to the best plant. The seed requires a minimum temperature of 13°C to germinate[200]. Grow them on fast and plant out after the last expected frosts, giving them cloche or frame protection for at least their first few weeks outdoors until they are growing strongly.

nwatta Requires a rich, well-drained moisture retentive soil and a very warm, sunny and sheltered position[1, 16, 37, 86]. Prefers a pH of 5.5 to 5.9, but tolerates up to 6.8[86]. Plants are tolerant of light shade[86] (This comment is probably more applicable to warmer climates than Britain[K.]). A frost-tender annual plant, the pumpkin or marrow is widely cultivated in temperate and tropical zones for its edible fruit. It has long been grown as a domestic plant and a number of different groups have been developed. Botanists have tried to classify these groups, though there is considerable overlap and clear distinctions are not always possible. Since they are very similar in their cultivation needs, we have treated all the groups together in this entry. The botanists classification is as follows:- C. pepo pepo. This includes the vegetable marrows, zucchinis, pumpkins and ornamental gourds. There are many named varieties and these can vary considerably in size, shape and flavour[27, 183, 200]. The cultivars with larger and rounder fruits are usually called pumpkins, the fruits are harvested in the autumn and can be stored for a few months. The marrows are smaller than pumpkins and generally sausage-shaped. These can also be harvested in the autumn and stored for a few months, but it is more usual to eat them whilst they are still very small, when they are known as courgettes. Harvesting the fruits of the marrows when very small stimulates the plant into making more flowers (and hence fruits) so it can be a very productive way of using the plant. Pumpkins and marrows succeed outdoors most summers in Britain[27], in fact many of these varieties are well adapted to cool growing conditions and therefore do well in the British climate[200]. C. pepo pepo fraterna. This is the probable progenitor of the marrows and so is of potential value in any breeding programmes. C. pepo ovifera. This group includes various summer squashes including the acorn, crookneck and patty pan squashes. C. pepo ovifera ozarkana. A probable ancestor of the summer squashes, it could be of value in breeding programmes. C. pepo texana. The Texas gourd, or wild marrow, is another form that could be of value in breeding programmes. Plants produce both male and female flowers. These are insect pollinated but in cool weather it is worthwhile hand pollinating[200]. Most cultivars are day-length neutral and so are able to flower and fruit throughout the British summer[200]. A fast-growing plant, trailing forms can be used to provide a summer screen[86]. This species does not hybridize naturally with other edible members of this genus[135]. Squashes and pumpkins can be differentiated from each other by their fruit stalk, it is angular and polygonal in pumpkins but thick, soft and round in squashes[132]. Pumpkins grow well with sweetcorn and thornapple but they dislike growing near potatoes[18, 20, 201]. They also grow well with nasturtiums, mint, beans and radishes[201].

3.2.11 Cucurbita argyrosperma

Cushaw Pumpkin
2 tlin 11 cyuc 4 kcaak 1 tcan 2 dwat 0.5 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikrlwis
hpa7tmwatli fyif hjonli

drutta Cucurbita argyrosperma is a ANNUAL CLIMBER growing to 0.5 m (1ft 8in) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 3 and is frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The sprouting seed produces a toxic substance in its embryo[65].

ksakta Eatable Parts: Flowers Fruit Leaves Oil Seed-Edible Uses: OilFruit - cooked[1, 177]. Used as a vegetable in pies etc, it can be stored for up to 6 months. Generally the fruit is fibrous, watery and less richly flavoured than C. maxima, C. moschata. and C. pepo[183]. The flesh can be dried, ground into a powder and mixed with cereals for making bread, cakes etc[183]. The fruit is up to 20cm in diameter[200]. Seed - raw, roasted or dried, ground into a powder and mixed with cereals when making bread etc[183]. The seed is rich in oil and has a pleasant nutty flavour. Although relatively large[183], they are very fiddly to use because they are covered with a fibrous coat[K]. An edible oil is obtained from the seed[183]. Leaves - cooked[135]. Flowers - cooked[135, 183].

tcanta OilThe seed is rich in oil.

dwatta VermifugeThe seeds are vermifuge[7, 88]. The complete seed, together with the husk, is used. This is ground into a fine flour, then made into an emulsion with water and eaten. It is then necessary to take a purgative afterwards in order to expel the tapeworms or other parasites from the body[7]. As a remedy for internal parasites, the seeds are less potent than the root of *Dryopteris felix-mas*, but they are safer for pregnant women, debilitated patients and children[238].

nrakta C. America? Origin is uncertain. ksacta Not known in the wild[135].

propta Seed - sow early to mid spring in a greenhouse in a rich soil. Germination should take place within 2 weeks. Sow 2 or 3 seeds per pot and thin out to the best plant. Grow them on fast and plant out after the last expected frosts, giving them cloche or frame protection for at least their first few weeks if you are trying them outdoors.

nwatta Requires a rich, well-drained moisture retentive soil and a very warm, sunny and sheltered position[1]. Plants are tolerant of high temperatures but sensitive to cool conditions, they favour moderate rainfall but the roots are sensitive to water-logging[200]. A frost-tender annual plant, the Cushaw pumpkin has long been cultivated for its edible fruit especially in warmer temperate and tropical areas. There are some named varieties[183] and these are day-length neutral[200]. Plants can succeed outdoors in Britain in most summers so long as they are started off early in a greenhouse and grown on quickly. Over time, various more or less distinct groups of cultivars have been developed and these have been classified by botanists as detailed below. Since they all have similar requirements, and it can be rather difficult to classify some varieties, we have dealt with them all here and not given them separate entries. C. argyrosperma. The Cushaw pumpkin, as dealt with in this entry. It is subdivided into:- C. argyrosperma argyrosperma. The silver-seed gourd. Cultivated mainly for its edible seeds which are larger than in other forms with an attractive silvery edge. C. argyrosperma callicarpa. Japanese pie pumpkin or green-stripe cushaw. C. argyrosperma stenosperma. Cultivated in Mexico, we do not know of a common name. This species does not hybridize naturally with other members of this genus, though crosses have been made under controlled conditions[86, 135]. Squashes and pumpkins can be differentiated from each other by their fruit stalk, it is angular and polygonal in pumpkins but thick, soft and round in squashes[132]. This species is included in C. moschata by some botanists[86].

3.2.12 Anethum graveolens

Dill

2 tlin 11 cyuc 4 kcaak 2 tcan 3 dwat 0.8 m hkuc
htut cyutli tcup hwicli hrasljut hpa7tli flatprikrlwis
hpa7tmwatli fyifxre7t hjonli

drutta Anethum graveolens is a ANNUAL growing to 0.8 m (2ft 7in) by 0.2 m (0ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 8. It is in leaf from May to November, in flower from April to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista Dill is said to contain the alleged 'psychotropic' myristicine[218]. There are also reports that dill can cause

photosensitivity and/or dermatitis in some people[218]. Avoid dill oil during pregnancy.

ksakta Edible Parts: Leaves Seed**Edible Uses:** Condiment Tea**Leaves** - raw or cooked[2, 4, 9, 14, 21]. Used as a flavouring in salads etc[132, 183]. The leaves lose their flavour if they are cooked for any length of time and so are best used raw or added to cooked dishes only a few minutes before the cooking is complete[244]. The leaves can be harvested at any time the plant is growing, but are best just before the plant flowers[244]. Per 100g, the plant contains 253 calories, 7.2g water, 20g protein, 4.4g fat, 55.8g carbohydrate, 11.9g fibre, 12.6g ash, 1784mg calcium, 543mg phosphorus, 48.8mg iron, 451mg magnesium, 208mg sodium, 3,308mg potassium, 3.3mg zinc, 0.42mg thiamine, 0.28mg riboflavin, 2.8mg niacin and 1.5mg vitamin B6[218]. Seed - raw or cooked. Very pungent and bitter in taste[4]. It is used as a flavouring in salads, preserves etc[2, 7, 9, 21, 46, 183], its chief uses being perhaps in making dill vinegar and as a flavouring in pickled gherkins[4]. It can also be sprouted and used in breads, soups and salad dressings[183]. Per 100g, the seed contains 305 calories, 7.7g water, 14.5g fat (0.73g saturated), 124mg phytosterol and no cholesterol), 55.2g carbohydrate, 21g fibre, 6.7g ash, 1,516mg calcium, 277mg phosphorus, 16.3mg iron, 256mg magnesium, 20mg sodium, 1,186mg potassium, 5.2mg zinc, 53IU vitamin A, 0.42mg thiamine and 0.28mg riboflavin[218]. An essential oil from the seed is used as a flavouring in the food industry[46, 105]. A tea is made from the leaves and/or the seeds[183].

tcanta Essential InsecticideThe seed contains up to 4% essential oils[244]. It is used in perfuming soaps[4], medicines and as a food flavouring[244]. Some compounds of dill (d-carvone is mentioned as one of them), when added to insecticides, have greatly increased the effectiveness of the insecticides[218].

dwatta Antihalitosis Aromatic Carminative Diuretic Galactagogue Stimulant StomachicDill has a very long history of herbal use going back more than 2,000 years. The seeds are a common and very effective household remedy for a wide range of digestive problems. An infusion is especially efficacious in treating gripe in babies and flatulence in young children. The seed is aromatic, carminative, mildly diuretic, galactagogue, stimulant and stomachic[4, 21, 46, 165]. It is also used in the form of an extracted essential oil[243]. Used either in an infusion, or by eating the seed whole, the essential oil in the seed relieves intestinal spasms and griping, helping to settle colic[254]. Chewing the seed improves bad breath[254]. Dill is also a useful addition to cough, cold and flu remedies, it can be used with antispasmodics such as Viburnum opulus to relieve period pains[254]. Dill will also help to increase the flow of milk in nursing mothers and will then be taken by the baby in the milk to help prevent colic[254].

nrakta W. Asia. Naturalized in Europe in the Mediterranean[100]. **ksacta** Fields, waste places etc in the Mediterranean[100].

propta Seed - sow April to early summer in situ and only just cover[200, 238]. The seed germinates in 2 weeks if the soil is warm. A regular supply of leaves can be obtained if successional sowings are made from May to the end of June[89, 200]. Autumn sowings can succeed if the winters are mild[4]. Dill is very intolerant of root disturbance and should not be transplanted because it will then quickly run to seed.

nwatta Landscape Uses:Border, Container. An easily grown plant[4], it prefers a moderately rich loose soil and full sun[14, 27, 88]. Requires a well-drained soil[27] and shelter from the wind[200]. Tolerates a pH in the range 5.3 to 7.8. Dill is a commonly cultivated herb, especially in warm temperate and tropical zones. It is grown mainly for its edible leaves and seeds, though it is also used medicinally. There are many named varieties[142, 183]. 'Bouquet' is an American cultivar that has a prolific production of seeds[238]. The sub-species *A. graveolens* sowa from India has a slightly different flavour to the type species[238]. The plant quickly runs to seed in dry weather[200]. It often self-sows when growing in a suitable position[37, 88]. A good companion for corn and cabbages, also in moderation for cucumbers, lettuce and onions, but it inhibits the growth of carrots[14, 18, 20]. Dill reduces a carrot crop if it is grown to maturity near them[201]. However, the young plant will help to deter carrot root fly[201]. The flowers are very attractive to bees[14, 18, 20]. **Special Features:**Attractive foliage, Edible, Fragrant

foliage, Not North American native, Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers.

3.2.13 *Cornus canadensis*

Creeping Dogwood, Bunchberry dogwood, Bunchberry 2 tlin 7 cyuc 4 kcak 2 tcan 2 dwat 0.3 m hkuc hmimhtut cyutli tcup hwicli hrsajlutnyikfrrip hpa7tli flatprik hpa7tmwatli xre7t hjonli

drutta *Cornus canadensis* is a PERENNIAL growing to 0.3 m (1ft) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower in June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Fruit**Edible Uses:** Pectin **Fruit** - raw or cooked[1, 101]. Pleasant but without much flavour[2, 55, 62]. The fruits are rather dry a bit gummy and rather mealy but they have a pleasant slightly sweet flavour, though they are not the type of fruit I would like to eat raw in quantity[K]. They can be added to breakfast cereals or used for making jams, pies, puddings etc[183]. An excellent ingredient for steamed plum puddings[183]. High in pectin[172], so it can be used with pectin-low fruits when making jam[K]. Pectin is said to protect the body against radiation[201]. The fruit is about 6mm in diameter[200] and is borne in small clusters on top of the plants[K].

tcanta Pectin PectinThe fruit is rich in pectin[172]. A good dense ground cover plant, growing well in light woodland[28, 208]. It takes a little while to settle down and needs weeding for the first few years[197] but becomes rampant when established and can then spread 60 - 90cm per year[208].

dwatta Analgesic Cathartic Febrifuge Kidney OphthalmicThe leaves and stems are analgesic, cathartic and febrifuge[257]. A tea has been used in the treatment of aches and pains, kidney and lung ailments, coughs, fevers etc[222]. A strong decoction has been used as an eye wash[222, 257]. The fruits are rich in pectin which is a capillary tonic, antioedemic, anti-inflammatory, antispasmodic and hypotensive[218]. Pectin also inhibits carcinogenesis and protects against radiation[218]. A tea made from the roots has been used to treat infant colic[222]. The mashed roots have been strained through a clean cloth and the liquid used as an eye-wash for sore eyes and to remove foreign objects from the eyes[257].

nrakta N. America - Newfoundland to Alaska, south to Virginia and California. **ksacta** Coniferous woods, thickets and damp clearings in peaty soils[43].

propta Seed - best sown as soon as it is ripe in a cold frame or in an outdoors seedbed if there is sufficient seed[80, 113]. The seed must be separated from the fruit flesh since this contains germination inhibitors[80, 164]. Stored seed should be cold stratified for 3 - 4 months and sown as early as possible in the year[164]. Scarification may also help as may a period of warm stratification before the cold stratification[80, 164]. Germination, especially of stored seed, can be very slow, taking 18 months or more[164]. Prick out the seedlings of cold-frame sown seeds into individual pots as soon as they are large enough to handle and grow the plants on for their first winter in a greenhouse, planting out in the spring after the last expected frosts. Division in spring. This plant can be a bit temperamental when it is being divided. We have found it best to tease out small divisions from the sides of the clump, to avoid the need to disturb the main clump by digging it up. Try to ensure that each division has already produced some roots. Pot them up in light shade in a greenhouse and make sure that they are not allowed to become dry. Once they are rooting and growing away well, which might take 12 months, they can be planted out into their permanent positions.

nwatta Landscape Uses:Rock garden, Specimen, Woodland garden. Succeeds in any soil of good or moderate fertility[11]. Easily grown in a peaty soil in shade or partial shade[187]. Grows well in heavy clay soils. Grows best in sandy soils[208]. Prefers a damp soil[1]. Not suitable for alkaline soils[28, 188]. A very ornamental plant[1], it grows

well with headers[187]. Special Features:Attracts birds, Attractive foliage, North American native, Wetlands plant. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. A clumping mat former. Forming a dense prostrate carpet spreading indefinitely [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

3.2.14 Coriandrum sativum

Coriander - Dhania - Cilantro, Coriander
2 tlin 11 cyuc 4 kcaak 4 tcan 4 dwat 0.5 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikli-wisslip hpa7tmwatli fyfixre7t hjonli

drutta Coriandrum sativum is a ANNUAL growing to 0.5 m (1ft 8in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to July, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista The plant can have a narcotic effect if it is eaten in very large quantities[201]. Powdered coriander and oil may cause allergic reactions and photosensitivity. Use dry coriander sparingly if suffering bronchial asthma and chronic bronchitis [301]

kcakta Edible Parts: Leaves Oil Seed Edible Uses: Condiment Oil Leaves - raw or cooked. They are used as a flavouring in salads, soups etc[2, 4, 21, 37, 61] and the fresh leaves are probably the most widely used flavouring herb in the world[268]. The leaves have an aromatic flavour[183]. It is foetid according to another report[4], whilst another says that the fresh leaves have a strong bedbug-like smell[244]. The leaves should not be eaten in large quantities[132]. The fresh leaves contain about 0.012% oxalic acid and 0.172% calcium[240]. Seed - cooked. It is used as a flavouring in many dishes including cakes, bread and curries, it is also widely used to flavour certain alcoholic liquors[2, 4, 5, 21, 27, 37]. The fresh seed has a disagreeable and nauseous smell, but when dried it becomes fragrant, the longer it is kept the more fragrant it becomes[4, 132]. Plants yield about 1½ tonnes per acre of seed[4]. The root is powdered and used as a condiment[161]. An essential oil from the seed is used as a food flavouring[21, 46, 61, 105]

tcanta Essential Fuel Fungicide Insecticide Oil Repellent An essential oil from the seed is used as a food flavouring, in perfumery, soap making etc[21, 46, 61, 74, 105]. It is also fungicidal and bactericidal[238]. The growing plant repels aphids[14, 20, 201]. A spray made by boiling of one part coriander leaves and one part anise seeds in two parts of water is very effective against red spider mites and woolly aphids[201]. An oil from the seed is used for making soap[74]. The report does not make it clear if the essential oil or the fixed oil is used[K]. The seed contains about 20% fixed oil[240], this has potential for industrial use in Britain, it could become an alternative to oilseed rape though the oil content is a bit on the low side at present (1995). The oil can be split into two basic types, one is used in making soaps etc, whilst the other can be used in making plastics[234]. The dried stems are used as a fuel[74].

dwatta Anti-diarrhoeal Antihistosis Appetizer Aromatherapy Aromatic Carminative Depurative Expectorant Narcotic Stimulant Stomachic Coriander is a commonly used

dormestic remedy, valued especially for its effect on the digestive system, treating flatulence, diarrhoea and colic[9, 244]. It settles spasms in the gut and counters the effects of nervous tension[254]. The seed is aromatic, carminative, expectorant, narcotic, stimulant and stomachic[4, 9, 21, 46, 147, 178, 201, 238]. It is most often used with active purgatives in order to disguise their flavour and combat their tendency to cause gripe[4, 244]. The raw seed is chewed to stimulate the flow of gastric juices and to cure foul breath[240, 268] and will sweeten the breath after garlic has been eaten[254]. Some caution is advised, however, because if used too freely the seeds become narcotic[4]. Externally the seeds have been used as a lotion or have been bruised and used as a poultice to treat rheumatic pains[254, 268]. The essential oil is used in aromatherapy. Its keyword is 'Appetite stimulant'[210]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve Coriandrum sativum (Coriander - Dhania) for dyspepsia, loss of appetite (see [302] for critics of commission E).

nrakta S. Europe. Naturalized in Britain[17]. ksakta Waste places and arable land, often by the sides of rivers[4, 9].

propta Seed - sow April in situ[1, 37]. The seed is slow to germinate and so on a garden scale it can also be sown in March in a cold frame. Sow a few seeds in each pot and then plant them out when they are growing away strongly in May[4]. The seed can also be sown in situ in the autumn[1]. Autumn sown plants will grow bigger and produce more seed.

nwatta Prefers a warm dry light soil[4, 27, 37]. Plants grown mainly for their seeds do well in partial shade, but when growing for the seed or essential oil a sunny position is preferred[238]. The plants dislike constant moisture[14] or too much nitrogen[200]. Another report says that coriander grows best when a cool damp spring is followed by a hot dry summer[238]. Coriander tends to run quickly to seed if the plants are too dry at the seedling stage[238]. Plants tolerate a pH in the range 4.9 to 8.3. Coriander is often cultivated, both on a garden scale and commercially, for its edible seed[4, 142], there are some named varieties[183]. The plant is fast-growing, ripening its seed without difficulty in Britain and it seems to be free of pests and diseases[234]. The seeds have been used medicinally and as a food flavouring since ancient times, and were introduced into Britain by the Romans[244]. In the Middle Ages they were added to love potions because of their reputation as aphrodisiacs[244]. The plants flowers are very attractive to pollinating insects[14, 18, 201]. Coriander is in general a good companion plant in the garden, helping to repel aphid and carrot root fly[238]. It grows well with anise, improving the germination rate when the two species are sown together[14, 18, 20, 238], but it grows badly with fennel, where it acts to reduce the seed yield of the fennel[14, 18, 20, 201, 238]. Coriander also grows particularly well with dill and chervil[201].

4 3 tlin

4.1 bwon

4.1.1 Hippophae salicifolia

Willow-Leaved Sea Buckthorn
tfo2n 3 tlin 7 cyuc 5 kcaak 5 tcan 3 dwat 15 m hkuc
htut cyutli kyuctcuphja7n hwicli hysjhrasjlutnyik hpa7tli flatprikliwis hpa7tmwatli nyanhjen hjonli

drutta Hippophae salicifolia is a deciduous Tree growing to 15 m (49ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 8 and is not frost tender. It is in flower in April, and the seeds ripen from September to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Wind. The plant is not self-fertile. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry moist or wet soil. The plant can tolerate strong winds but not maritime exposure.

ksakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[2, 46]. A very nutritious food, and possibly the most nutritious fruit that can be grown in temperate climates. It is very rich in vitamins, especially vitamin C, plus minerals and bioflavonoids, and is also a source of essential fatty acids[214]. It comes ripe in late summer, though it can be eaten for about a month before this, and will hang on the tree until mid-winter, by which time the flavour has become much milder, though it has also become very soft and difficult to pick[K]. We and many of our visitors really like this fruit, however the flavour is somewhat like a sharp lemon and a lot of people find this too acid for them[K]. It also makes a good salad dressing[K]. The fruits of some species and cultivars (not specified) contain up to 9.2% oil[214]. The fruit is used for making preserves[105, 183]. It is being increasingly used in making fruit juices, especially when mixed with other fruits, because of its reputed health benefits[214]. The fruit becomes less acid after a frost or if cooked[74].

tcanta Fuel Pioneer Soil stabilization WoodThe plant is very fast growing, even in areas exposed to maritime winds, and it makes an excellent pioneer species for providing shelter and helping to establish woodland conditions. The plant is very light-demanding and so will eventually be shaded out by the woodland trees, thus it will never out-stay its welcome[K]. The trees have an extensive and vigorous root system and sucker freely once established. They are thus excellent for stabilising the soil, especially on slopes, and are often planted in the Himalayas to prevent land slips on the mountain slopes and create conditions for the re-establishment of woodlands[K]. The wood is very tough and hard - it can be used for many purposes including wheel hubs and other applications where toughness is essential[K]. It is also used for fuel[146].

dwatta Cancer Cardiac Eczema Poultice Vitamin CThe tender branches and leaves contain bio-active substances which are used to produce an oil that is quite distinct from the oil produced from the fruit. This oil is used as an ointment for treating burns[214]. A high-quality medicinal oil is made from the fruit and used in the treatment of cardiac disorders, it is also said to be particularly effective when applied to the skin to heal burns, eczema and radiation injury, and is taken internally in the treatment of stomach and intestinal diseases[214]. The fruit is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavonoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta E. Asia - Himalayas. ksakta Alluvial gravel, wet landslips and riversides to 3500 metres[51].

propta Seed - sow spring in a sunny position in a cold frame[78]. Germination is usually quick and good although 3 months cold stratification may improve the germination rate. Alternatively the seed can be sown in a cold frame as soon as it is ripe in the autumn. Prick out the seedlings into individual pots when they are large enough to handle and grow on in a greenhouse for their first winter. Plant out in late spring into their permanent positions. Male seedlings, in spring, have very prominent axillary buds whilst females are clear and smooth at this time[78]. Cuttings of half-ripe wood, June/July in a frame[200]. Difficult[113]. This is the easiest method of vegetative propagation[214]. Cuttings of mature wood in autumn[200]. Difficult[113]. The cuttings should be taken at the end of autumn or very early in the spring before the buds burst. Store them in sand and peat until April, cut into 7-9cm lengths and plant them in a plastic tent with bottom heat[214]. Rooting should take place within 2 months and they can be put in their permanent positions in the autumn[214]. Division of suckers in the winter. They can be planted out direct into their permanent positions and usually establish well and quickly[K]. Layering in autumn[200].

nwatta Succeeds in most soils so long as they are not too dry[200]. Grows well by water[1, 11]. A fast-growing and very wind-resistant tree, it is an excellent pioneer species for re-establishing woodlands[K]. This species is not hardy in the colder areas of the country, it tolerates temperatures down to about -10°C[200]. Members of this genus are attracting considerable interest from breeding institutes for their nutrient-rich fruits that can promote the general health of the body (see edible and medicinal uses below)[214]. The deeply cleft bark favours the growth of epiphytes[146]. Plants in

this genus are notably resistant to honey fungus[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. Dioecious. Male and female plants must be grown if seed is required.

4.1.2 Hippophae rhamnoides

Sea Buckthorn, Seaberry

tfo2n 3 tlin 7 cyuc 5 kcaak 5 tcan 5 dwat 6 m hkuc htut cyutll hgatkuyctuphja7n hwicll hyishrsrajlutnyik hpa7tll flatrpkliwis hpa7tmwatll nyanhjen hjonli

druitta Hippophae rhamnoides is a deciduous Shrub growing to 6 m (19ft) by 2.5 m (8ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in April, and the seeds ripen from September to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Wind. The plant is not self-fertile. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry moist or wet soil and can tolerate drought. The plant can tolerate maritime exposure.

pcista Some reports suggest that the fruit is poisonous[13, 100], whilst it may be very acid it is most definitely not poisonous[65]. Avoid during pregnancy.

ksakta Edible Parts: Fruit OilEdible Uses: OilFruit - raw or cooked. Very rich in vitamin C (120mg per 100g)[74] and vitamin A[183], they are too acid when raw for most peoples tastes[11, 158], though most children seem to relish them[K]. Used for making fruit juice, it is high in vitamins and has an attractive aroma[141]. It is being increasingly used in making fruit juices, especially when mixed with other fruits, because of its reputed health benefits[214]. The fruits of some species and cultivars (not specified) contain up to 9.2% oil[214]. The fruit is very freely borne along the stems[K] and is about 6 - 8mm in diameter[200]. The fruit becomes less acid after a frost or if cooked[74]. The fruit is ripe from late September and usually hangs on the plants all winter if not eaten by the birds. It is best used before any frosts since the taste and quality of frosted berries quickly deteriorates[214].

tcanta Charcoal Cosmetic Dye Fodder Fuel Oil Pioneer Soil stabilization WoodVery tolerant of maritime exposure[29, 49, 75, 182], it can be used as a shelter hedge. It dislikes much trimming[75]. A very thorny plant, it quickly makes an impenetrable barrier. Sea buckthorn has an extensive root system and suckers vigorously and so has been used in soil conservation schemes, especially on sandy soils. The fibrous and suckering root system acts to bind the sand[186, 244]. Because the plant grows quickly, even in very exposed conditions, and also adds nitrogen to the soil, it can be used as a pioneer species to help the re-establishment of woodland in difficult areas. Because the plant is very light-demanding it will eventually be out-competed by the woodland trees and so will not out-stay its welcome[K]. The seeds contain 12 - 13% of a slow-drying oil[240]. The vitamin-rich fruit juice is used cosmetically in face-masks etc[9]. A yellow dye is obtained from the fruit[74]. A yellow dye is obtained from the stems, root and foliage[4]. A blackish-brown dye is obtained from the young leaves and shoots[74]. Wood - tough, hard, very durable, fine-grained. Used for fine carpentry, turning etc[46, 61, 74]. The wood is also used for fuel and charcoal[146].

dwatta Astringent Cancer Cardiac Eczema Poultice Tonic Vermifuge Vitamin CThe twigs and leaves contain 4 - 5% tannin[240]. They are astringent and vermifuge[7, 100]. The tender branches and leaves contain bio-active substances which are used to produce an oil that is quite distinct from the oil produced from the fruit. Yields of around 3% of oil are obtained[240]. This oil is used as an ointment for treating burns[214]. A high-quality medicinal oil is made from the fruit and used in the treatment of cardiac disorders, it is also said to be particularly effective when applied to the skin to heal burns, eczema and radiation injury, and is taken internally in the treatment of stomach and intestinal diseases[214]. The fruit is astringent and used as a tonic[9,

254]. The freshly-pressed juice is used in the treatment of colds, febrile conditions, exhaustion etc[9]. The fruit is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214]. The juice is also a component of many vitamin-rich medications and cosmetic preparations such as face-creams and toothpastes[9]. A decoction of the fruit has been used as a wash to treat skin irritation and eruptions[254].

nrakta Europe, including Britain, from Norway south and east to Spain and Asia to Japan and the Himalayas. ksacta Usually found near the coast, often forming thickets on fixed dunes and sea cliffs[9, 17, 244].

propta Seed - sow spring in a sunny position in a cold frame[78]. Germination is usually quick and good although 3 months cold stratification may improve the germination rate. Alternatively the seed can be sown in a cold frame as soon as it is ripe in the autumn. Prick out the seedlings into individual pots when they are large enough to handle and grow on in a greenhouse for their first winter. Plant out in late spring into their permanent positions. Male seedlings, in spring, have very prominent axillary buds whilst females are clear and smooth at this time[78]. Cuttings of half-ripe wood, June/July in a frame[200]. Difficult[113]. This is the easiest method of vegetative propagation[214]. Cuttings of mature wood in autumn[200]. Difficult[113]. The cuttings should be taken at the end of autumn or very early in the spring before the buds burst. Store them in sand and peat until April, cut into 7 - 9cm lengths and plant them in a plastic tent with bottom heat[214]. Rooting should take place within 2 months and they can be put in their permanent positions in the autumn[214]. Division of suckers in the winter. They can be planted out direct into their permanent positions and usually establish well and quickly[K]. Layering in autumn[200].

nwatta Agroforestry Services: Alley crop Agroforestry Services: Nitrogen Agroforestry Services: Wind-break Fodder: Bank Industrial Crop: Biomass Management: Coppice Management: Standard Other Systems: Strip intercrop Staple Crop: OilLandscape Uses:Border, Seashore, Specimen. Succeeds in most soils[200], including poor ones[186], so long as they are not too dry[182, 200]. Grows well by water and in fairly wet soils[182]. Established plants are very drought resistant[186]. Requires a sunny position[3], seedlings failing to grow in a shady position and mature shrubs quickly dying if overshadowed by taller plants[186]. Does well in very sandy soils[1, 186]. Very tolerant of maritime exposure[75]. Plants are fairly slow growing[75]. Although usually found near the coast in the wild, they thrive when grown inland[11] and are hardy to about -25°C[184]. A very ornamental plant[1, 11], it is occasionally cultivated, especially in N. Europe, for its edible fruit, there are some named varieties[183]. 'Leikora' is a free-fruiting form, developed for its ornamental value. Members of this genus are attracting considerable interest from breeding institutes for their nutrient-rich fruits that can promote the general health of the body (see edible and medicinal uses below)[214]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[113, 186, 200]. Plants produce abundant suckers, especially when grown on sandy soils[186]. Dioecious. Male and female plants must be grown if seed is required. The sexes of plants cannot be distinguished before flowering, but on flowering plants the buds of male plants in winter are conical and conspicuous whilst female buds are smaller and rounded[11]. Plants in this genus are notably resistant to honey fungus[200].Special Features:Not North American native, Naturalizing, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant

in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A clumping plant, forming a colony from shoots away from the crown but with a limited spread [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is suckering with new plants from underground runners away from the plant [2-1].

4.1.3 Apios americana

Ground Nut

tfo2n 3 tlin 7 cyuc 5 kca3 3 tcan 1 dwat 1.2 m hkuc hmimhtut cyutli tcup hwicli hrasjlut hpa7tli frusflatprklwis hpa7tmwatli xre7t hjonli

drutta Apios americana is a PERENNIAL growing to 1.2 m (4ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf from April to November, in flower from June to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Root Seed SeedpodEdible Uses: Tuber - raw or cooked[1, 2, 27, 55, 62, 63]. A delicious flavour somewhat like roasted sweet potatoes, it always receives very high marks in taste trials with us[K]. The tuber can also be dried and ground into a powder then used as a thickening in soups etc or can be added to cereal flours when making bread[132, 257]. Tubers contain 17% crude protein, this is more than 3 times that found in potatoes[183]. The tubers can be harvested in their first year but they take 2 - 3 years to become a sizeable crop[160]. They can be harvested at any time of the year but are at their best in the autumn[160]. The tubers can also be harvested in the autumn and will store until at least the spring[K]. Yields of 2.3 kilos of tubers per plant have been achieved[222]. Seed - cooked[62]. Rather small and not produced very freely[K], they are used like peas and beans[183, 213]. A good source of protein, they can be ground into a powder and added to cereals when making bread etc[257]. Young seedpods[55, 62, 95, 177].

tcanta Companion LatexThere is one report that the plant contains a latex which could be used in the production of rubber[269].

dwatta The tubers were used in folk remedies for that cancerous condition known as "Proud Flesh" in New England. Nuts were boiled and made into a plaster, "For to eat out the proud flesh they (the Indians) take a kind of earth nut boyled and stamped"[269].

nrakta N. America - Pennsylvania. Occasionally naturalized in S. Europe[50]. ksacta Usually found in low damp bottomland or riparian woods and thickets, it is also often found round ancient Indian campsites[43, 62, 269].

propta Seed - pre-soak for 3 hours in tepid water and sow February/March in a cold frame. The seed usually germinates in 1 - 3 months at 15°C[134]. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for their first winter, planting them out in late spring or early summer. Division can be carried out at almost any time of the year, though spring is probably the best time. Simply dig up the roots, harvest the tubers and replant them where you want the plants to grow. It is also possible to harvest the tuber in winter, store them in a cool fairly dry but frost-free place over the winter and then plant them out in the spring. The tubers lose moisture rapidly once they have been harvested, so make sure that you store them in a damp medium such as leafmold.

nwatta Agroforestry Services: Nitrogen Edible Beans Management: Standard New Crop for Tubers Staple Crop: ProteinPrefers a light rich soil and a sunny position[1, 27]. When grown in a warm dry situation in a well-drained sandy soil, the plants will be long lived

with the tuberous roots increasing in size and number each year[245]. Another report says that the plant prefers light dappled shade[200]. It tolerates acid soils[160]. Dislikes windy situations[K]. Groundnut is reported to tolerate an annual precipitation in the range of 97 to 117cm, an average annual temperature range of 9.9 to 20.3°C and a pH in the range of 4.5 to 7.0[269]. It tolerates a range of climatic conditions and produces well in cool temperate zones as well as the subtropical conditions of South Florida[269]. Whilst most reports suggest that this species should be cold hardy in all parts of Britain, one report says that the plants may require protection in severe winters[134]. The groundnut has occasionally been cultivated for its edible root and has the potential to become a commercial crop[95, 183]. Cultivars have been selected in the past for higher yields and larger tubers, it is said that the yields from some of these cultivars can rival potato crops[95, 183]. Some of these cultivars are gradually becoming available in Britain[K]. The best yields are obtained when the plant is left in the ground for at least two growing seasons. Yields of 30 tonnes per hectare have been achieved from weed crops growing in a field of cranberries[269]. This species has been grown in the past in S. Europe[46, 50] and has been suggested as a nitrogen-fixing edible ornamental for permaculturalists[222]. The plant forms long thin roots which enlarge at intervals along their length to form the tubers, the effect is somewhat like a necklace[K]. Plants can be invasive once they are established[200] and have become a weed of cultivated cranberry crops in N. America[269]. A climbing plant, twining around the thin branches of other plants for support[K]. The flowers have a scent of violets[245]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Herbaceous. A suckering vine sending up suckers some distance main plant [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

4.1.4 *Apios Americana*

Ground Nut
tfo2n 3 tin 7 cyuc 5 kcaak 3 tcan 1 dwat 1.2 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlut hpa7tli frusflatprikhlwis
hpa7tmwatli xre7t hjonli

drutta *Apios Americana* is a PERENNIAL growing to 1.2 m (4ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf from April to November, in flower from June to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Root Seed Seedpod Edible Uses: Tuber - raw or cooked[1, 2, 27, 55, 62, 63]. A delicious flavour somewhat like roasted sweet potatoes, it always receives very high marks in taste trials with us[K]. The tuber can also be dried and ground into a powder then used as a thickening in soups etc or can be added to cereal flours when making bread[132, 257]. Tubers contain 17% crude protein, this is more than 3 times that found in potatoes[183]. The tubers can be harvested in their first year but they take 2 - 3 years to become a sizeable crop[160]. They can be harvested at any time of the year but are at their best in the autumn[160]. The tubers can also be harvested in the autumn and will store until at least the spring[K]. Yields of 2.3 kilos of tubers per plant have been achieved[222]. Seed-cooked[62]. Rather small and not produced very freely[K], they are used like peas and beans[183, 213]. A good source of protein, they can be ground into a powder and added to cereals when making bread etc[257]. Young seedpods[55, 62, 95, 177].

tcanta Companion Latex There is one report that the plant contains a latex which could be used in the production of rubber[269].

dwatta The tubers were used in folk remedies for that cancerous condition known as "Proud Flesh" in New England. Nuts were boiled and made into a plaster, "For to eat out the proud flesh they (the Indians) take a kind of earth nut boyled and stamped"[269].

nrakta N. America - Pennsylvania. Occasionally naturalized in S. Europe[50]. *ksacta* Usually found in low damp bottomland or riparian woods and thickets, it is also often found round ancient Indian campsites[43, 62, 269].

propta Seed - pre-soak for 3 hours in tepid water and sow February/March in a cold frame. The seed usually germinates in 1 - 3 months at 15°C[134]. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for their first winter, planting them out in late spring or early summer. Division can be carried out at almost any time of the year, though spring is probably the best time. Simply dig up the roots, harvest the tubers and replant them where you want the plants to grow. It is also possible to harvest the tuber in winter, store them in a cool fairly dry but frost-free place over the winter and then plant them out in the spring. The tubers lose moisture rapidly once they have been harvested, so make sure that you store them in a damp medium such as leafmold.

nwatta Agroforestry Services: Nitrogen Edible Beans Management: Standard New Crop for Tubers Staple Crop: Protein Prefers a light rich soil and a sunny position[1, 27]. When grown in a warm dry situation in a well-drained sandy soil, the plants will be long lived with the tuberous roots increasing in size and number each year[245]. Another report says that the plant prefers light dappled shade[200]. It tolerates acid soils[160]. Dislikes windy situations[K]. Groundnut is reported to tolerate an annual precipitation in the range of 97 to 117cm, an average annual temperature range of 9.9 to 20.3°C and a pH in the range of 4.5 to 7.0[269]. It tolerates a range of climatic conditions and produces well in cool temperate zones as well as the subtropical conditions of South Florida[269]. Whilst most reports suggest that this species should be cold hardy in all parts of Britain, one report says that the plants may require protection in severe winters[134]. The groundnut has occasionally been cultivated for its edible root and has the potential to become a commercial crop[95, 183]. Cultivars have been selected in the past for higher yields and larger tubers, it is said that the yields from some of these cultivars can rival potato crops[95, 183]. Some of these cultivars are gradually becoming available in Britain[K]. The best yields are obtained when the plant is left in the ground for at least two growing seasons. Yields of 30 tonnes per hectare have been achieved from weed crops growing in a field of cranberries[269]. This species has been grown in the past in S. Europe[46, 50] and has been suggested as a nitrogen-fixing edible ornamental for permaculturalists[222]. The plant forms long thin roots which enlarge at intervals along their length to form the tubers, the effect is somewhat like a necklace[K]. Plants can be invasive once they are established[200] and have become a weed of cultivated cranberry crops in N. America[269]. A climbing plant, twining around the thin branches of other plants for support[K]. The flowers have a scent of violets[245]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Herbaceous. A suckering vine sending up suckers some distance main plant [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

4.1.5 *Elaeagnus parvifolia*

Autumn olive
tfo2n 3 tin 7 cyuc 4 kcaak 2 tcan 2 dwat 4.5 m hkuc
htut cyutli hgatkyuctup hwicli hshirasjlutnyik hpa7tli flatprikhlwis hpa7tmwatli xre7t hjonli

drutta *Elaeagnus parvifolia* is a deciduous Shrub growing to 4.5 m (14ft) by 3 m (9ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to June, and the seeds ripen

from September to November. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

kcakta Edible Parts: Fruit SeedEdible Uses: Fruit - raw, cooked or added to curries[2, 105, 183]. The fruit must be fully ripe before it can be enjoyed raw, if even slightly underripe it will be quite astringent - though children seem to love it at the slightly unripe stage[K]. The fruit is about 8mm in diameter[200] and contains a single large seed[K]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous.

tcanta Hedge HedgeVery tolerant of maritime exposure, it can be grown as an informal hedge in exposed positions[75].

dwatta Astringent Cancer DysenteryThe unripe fruit is astringent and is eaten in the treatment of bloody dysentery[272]. The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta E. Asia - Himalayas. ksacta Shrubberries, 1500 - 3000 metres, from Afghanistan to S.W. China[51]. Forest openings at elevations of 1300 - 3000 metres in Nepal[272].

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate in late winter or early spring, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Good percentage[78]. Cuttings of mature wood of the current year's growth, 10 - 12cm with a heel, November in a frame. Leave for 12 months. Fair to good percentage[78]. Layering in September/October. Takes 12 months[78].

nwatta Succeeds in most soils that are well-drained[11, 200]. Prefers a soil that is only moderately fertile, succeeding in very poor soils and in dry soils[11, 200]. Prefers a light sandy loam and a sunny position[11]. Dislikes shallow chalk soils[98]. Plants are very drought resistant[1] and very tolerant of maritime exposure[75]. A very hardy plant, tolerating temperatures down to at least -40°C[200]. Somewhat similar to *E. multiflora*, but flowering a few weeks later[182]. The flowers are rich in nectar and very aromatic, they are much visited by bees. This species is notably resistant to honey fungus[88, 200]. Plants can fruit in 6 years from seed[160]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[160, 200]. An excellent companion plant, when grown in orchards it can increase yields from the fruit trees by up to 10%.

4.1.6 *Hedysarum boreale*

Sweet Vetch, Utah sweetvetch, Northern sweetvetch
tfo2n 3 tlin 7 cyuc 4 kcak 3 tcan 0 dwat 0.1 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliw
hpa7tmwatli xre7t hjonli

drutta *Hedysarum boreale* is a PERENNIAL growing to 0.1 m (0ft 4in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista The sub-species *H. boreale mackenzii* is said to have a slightly toxic root, but no mention about toxicity for

this species has been found.

kcakta Edible Parts: RootEdible Uses: Young tender roots - raw or cooked[183]. Sliced and eaten raw, boiled, baked or added to soups[183]. A sweet carrot[105] or liquorice-like flavour[183].

nrakta Northern N. America - Saskatchewan to Arizona. ksacta Calcareous gravels and rocky slopes[204].

propta Seed - sow in a cold frame as soon as it is ripe or in the spring[200]. Stored seed should be pre-soaked for 24 hours in warm water. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant them out into their permanent positions in the summer. Division in spring. Great care is needed since the plant dislikes root disturbance[200].

nwatta Easily grown in ordinary garden soil in a sunny position, preferring a deep well-drained sandy loam[1, 200]. Plants strongly resent root disturbance and should be placed in their permanent positions as soon as possible[1]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

4.1.7 *Hedysarum boreale mackenzii*

Liquorice Root

tfo2n 3 tlin 7 cyuc 4 kcak 0 tcan 0 dwat m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliw
hpa7tmwatli xre7t hjonli

drutta *Hedysarum boreale mackenzii* is a PERENNIAL growing to 0.1 m (0ft 4in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista The root is said to be slightly toxic.

kcakta Edible Parts: RootEdible Uses: Root - raw or cooked[177]. Long and sweet[46, 61] with a liquorice-like flavour[183]. Used in spring, the root is crisp and juicy but it becomes tough and woody as the season advances[2, 183].

nrakta Western N. America - Colorado. ksacta Calcareous gravels and slopes[172].

propta Seed - sow in a cold frame as soon as it is ripe or in the spring[200]. Stored seed should be pre-soaked for 24 hours in warm water. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant them out into their permanent positions in the summer. Division in spring. Great care is needed since the plant dislikes root disturbance[200].

nwatta Easily grown in ordinary garden soil in a sunny position, preferring a deep well-drained sandy loam[1, 200]. Plants strongly resent root disturbance and should be placed in their permanent positions as soon as possible[1]. Does well in the rock garden or border[1]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200].

4.1.8 *Elaeagnus umbellata*

Autumn Olive

tfo2n 3 tlin 7 cyuc 4 kcak 3 tcan 2 dwat 4.5 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlutnyik hpa7tli flatprikliw
hpa7tmwatli xre7t hjonli

drutta *Elaeagnus umbellata* is a deciduous Shrub growing to 4.5 m (14ft) by 4 m (13ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to June, and the seeds ripen from September to November. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees.

It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

pcista E. umbellata has the potential of becoming one of the most troublesome adventive shrubs in the central and eastern United States.

kcakta Edible Parts: Fruit Seed**Edible Uses:** Fruit - raw or cooked[2, 46, 105]. Juicy and pleasantly acid, they are tasty raw and can also be made into jams, preserves etc[160, 183, 194]. The fruit must be fully ripe before it can be enjoyed raw, if even slightly under-ripe it will be quite astringent[K]. The fruit contains about 8.3% sugars, 4.5% protein, 1% ash[194]. The vitamin C content is about 12mg per 100g[194]. Mature bushes in the wild yield about 650g of fruit over 2 - 3 pickings[194]. The harvested fruit stores for about 15 days at room temperature[194]. The fruit is about 8mm in diameter[200] and contains a single large seed[K]. **Seed - raw or cooked**[194]. It can be eaten with the fruit though the seed case is rather fibrous[160].

tcanta Companion Fodder Fuel Hedge Hedge Very tolerant of maritime exposure, it makes a good informal hedge, succeeding even in very exposed positions[75]. The plants make a reasonable wind-protecting screen, they are about as wide as they are tall. They make a good companion hedge, enriching the soil and fertilizing neighbouring plants[K]. The wood is a good fuel[146].

dwatta Astraling Cancer Cardiac Pectoral Stimulant Vitamin C The flowers are astringent, cardiac and stimulant[240]. The seeds are used as a stimulant in the treatment of coughs[240]. The expressed oil from the seeds is used in the treatment of pulmonary affections[240]. The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta E. Asia - China, Japan, Himalayas. **ksacta** Thickets and thin woods in the lowland and hills[58].

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate in late winter or early spring, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Good percentage[78]. Cuttings of mature wood of the current year's growth, 10 - 12cm with a heel, November in a frame. Leave for 12 months. Fair to good percentage[78]. Layering in September/October. Takes 12 months[78].

nwatta Agroforestry Services: Nitrogen Agroforestry Services: Windbreak Fodder: Bank Industrial Crop: Biomass Management: Coppice Management: Standard Minor Global Crop Succeeds in most soils that are well-drained[11, 200], though it dislikes shallow chalk soils[98]. It prefers a soil that is only moderately fertile, succeeding in very poor soils and in dry soils[11, 200]. Prefers a light sandy loam and a sunny position[11]. Established plants are very drought resistant[1]. A very hardy plant, tolerating temperatures down to at least -40°C[200]. This species is somewhat similar to *E. multiflora*, but it flowers a few weeks later[182]. Sometimes cultivated for its edible fruit, there are some named varieties[183]. 'Cardinal' and 'Red Wing' are very good fruiting forms (developed for ornament and not for fruit quality)[182]. 'Jazbo' has been bred for its edible fruits which are said to be ripe when 'they drop into your hand'[214]. This makes them valuable in breeding programmes to develop easily harvested fruits[214]. Flowers are rich in nectar and very aromatic, they are much visited by bees. Polymorphic[11, 275]. This species is notably resistant to honey fungus[88, 200]. Plants can fruit in 6 years from seed[160]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is

utilized by the growing plant but some can also be used by other plants growing nearby[160, 200]. An excellent companion plant, when grown in orchards it can increase yields from the fruit trees by up to 10%. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.1.9 *Glycyrrhiza lepidota*

American Liquorice

tfo2n 3 tlin 8 cyuc 4 kca3 3 tcan 3 dwat 1 m hkuc
hmimhtut cyutli tcup hwicli hrasljut hpa7tli flatprikhwis
hpa7tmwatli xre7t hjonli

drutta Glycyrrhiza lepidota is a PERENNIAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Very young growth can be poisonous to animals[212].

kcakta Edible Parts: Leaves Root**Edible Uses:** Root - raw or cooked[2, 46, 61, 203]. Long, sweet and fleshy[105], when slow roasted they are said to taste like sweet potatoes[183, 207]. They can be used as a flavouring in other foods and can also be chewed raw as a masticatory[177, 183, 212], making an excellent tooth cleaner and also very good for teething children. The root contains 6% glycyrrhizin, a substance that is 50 times sweeter than sugar[183]. The tender young shoots can be eaten raw in the spring[183, 257].

tcanta Nitrogen fixer. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Birthing aid Foot care Odontalgic Poultice Tonic American liquorice was widely employed medicinally by a number of native North American Indian tribes who used it in the treatment of a range of diseases[257]. All parts of the body are medicinal, but the roots are the most active part. This species has properties similar to other liquorices which are widely used medicinally, though this species is rather neglected in modern literature. An infusion of the root is used to speed the delivery of the placenta after childbirth, it is also used to treat coughs, diarrhoea, chest pains, fevers in children, stomach aches etc[207, 257]. It is also used as a wash or poultice on swellings[257]. The chewed root is retained in the mouth as a treatment for toothache and sore throats[207, 257]. The mashed leaves are used as a poultice on sores[207, 257]. The leaves have been placed in the shoes to absorb moisture[257].

nrakta N. America - Saskatchewan to British Columbia, south to California and Mexico. **ksacta** Cultivated ground, waste places, roadsides, prairies, gravelly river bottoms and moist mountain draws to 2,100 metres[212]. Usually grows in patches, frequently in heavy clay and saline soils[212].

propta Pre-soak the seed for 24 hours in warm water and then sow spring or autumn in a greenhouse[200]. Prick out the seedlings into individual pots when they are large enough to handle, and grow them on for their first winter in a greenhouse. Plant out in late spring or early summer when in active growth. Plants are rather slow to grow from seed[238]. Division of the root in spring or autumn. Each division must have at least one growth bud. Autumn divisions can either be replanted immediately or stored in clamps until the spring and then be planted out[200]. It is best to pt up the smaller divisions and grow them on in a cold frame until they are established before planting them out in the spring or summer.

nwatta Requires a deep well cultivated fertile moisture-retentive soil for good root production[200]. Prefers a sandy soil with abundant moisture[238]. Slightly alkaline conditions produce the best plants[238]. A very deep-rooted plant, it can be difficult to eradicate once it is established[238]. Unless seed is required, the plant is usually prevented from

Use that it puts more energy into producing good quality roots[238]. Plants are growing very well at Kew[K]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2 mran

4.2.1 *Tilia x europaea*

Linden, Common Lime

3 tlin 9 cyuc 5 kcaak 3 tcan 3 dwat 35 m hkc
hmimhtut cyutli tcup hwicli hyishras|lutnyik hpa7tli flatprikli-
wis hpa7tmwatli xre7t hjonli

drutta *Tilia x europaea* is a deciduous Tree growing to 35 m (114ft) by 15 m (49ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista If the flowers used for making tea are too old, they may produce symptoms of narcotic intoxication[4].

kcakta Edible Parts: Flowers Leaves Manna Sap
Edible Uses: Chocolate Sweetener Tea Young leaves - raw[6, 177, 183]. Excellent in salads, they are mild and mucilaginous. A refreshing tea is made from the dried flowers[183]. A honey-like fragrance[183]. Some caution is advised, see notes above on toxicity. Flowers - used as a vegetable[183]. A very acceptable chocolate substitute can be made from a paste of the ground-up flowers and immature fruit. Trials on marketing the product failed because the paste is very apt to decompose[2, 115]. Sap - used as a drink or concentrated to make a syrup and used as a sweetener[4, 115, 183]. An edible manna is obtained from the tree[183]. No further details, does this report refer to the sap?

tcanta Charcoal Fibre Paper Wood A fibre from the inner bark is used to make mats, shoes, baskets, ropes etc[1, 13, 14, 46, 61, 100]. It is also suitable for cloth[115]. It is harvested from trunks that are 15 - 30cm in diameter[115]. The fibre can also be used for making paper[189]. The stems are harvested in spring or summer, the leaves are removed and the stems steamed until the fibres can be stripped. The outer bark is removed from the inner bark by peeling or scraping. The fibres are cooked for 2 hours with lye and then beaten in a ball mill. The paper is beige in colour[189]. Wood - soft, white, easily carved. It is very suitable for carving domestic items and small non-durable items[4, 13, 46, 61, 115]. A charcoal made from the wood is used for drawing[46, 61, 115]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Antispasmodic Cholagogue Diaphoretic Diuretic Emollient Expectorant Hypotensive Sedative Skin Vasodilator Lime flowers are a popular domestic remedy for a number of ailments, especially in the treatment of colds and other ailments where sweating is desirable[9]. A tea made from the fresh or dried flowers is antispasmodic, diaphoretic, expectorant, hypotensive, laxative and sedative[4, 9, 13, 226, 238]. Lime flower tea is also used internally in the treatment of indigestion, hypertension, hardening of the arteries, hysteria, nervous vomiting or palpitation[4, 238]. The flowers are harvested commercially and often sold in health shops etc[226]. Lime flowers are said to develop narcotic properties as they age and so they should only be harvested when freshly opened[238]. A charcoal made from the wood

is used in the treatment of gastric or dyspeptic disturbances and is also made into a powder then applied to burns or sore places[4].

nrakta A hybrid, probably *T. cordata*. x *T. platyphyllos*. *ksakta* Not known in a truly wild situation.

propta Seed - much of the seed produced in Britain is not viable, cut a few seedcases open to see if there is a seed inside[80]. If possible, obtain fresh seed that is ripe but has not as yet developed a hard seed coat and sow it immediately in a cold frame. It may germinate in the following spring though it could take 18 months[80]. Stored seed can be very slow to germinate. It has a hard seed coat, embryo dormancy and a hard coat on the pericarp. All these factors mean that the seed may take up to 8 years to germinate[80]. One way of shortening this time is to stratify the seed for 5 months at high temperatures (10°C at night, up to 30°C by day) and then 5 months cold stratification[80]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Layering in spring just before the leaves unfurl. Takes 1 - 3 years[78]. Suckers, when formed, can be removed with as much root as possible during the dormant season and replanted immediately[200].

nwatta Prefers a good moist loamy alkaline to neutral soil but succeeds on slightly acid soils[11, 200]. Grows poorly on any very dry or very wet soil[200]. Succeeds on poorer soils than *T. platyphyllos*[11, 14]. Tolerates considerable exposure[125]. A very valuable bee plant[111]. The flowers are toxic to bees[188]. A food plant for the caterpillars of many butterfly and moth species[30]. This tree is frequently infested by aphids[17, 200], which cover the ground and the leaves with a sticky honeydew[188]. Although a hybrid species, it does produce fertile seed in Britain[17]. Lime trees tend to hybridise freely if other members of the genus are growing nearby[238]. If growing plants from seed it is important to ensure the seed came from a wild source or from an isolated clump of the single species[K]. Easily transplanted, even when quite large, trees up to 60 years old have been moved successfully[1, 74]. Can be coppiced, the tree produces suckers very freely[98, 200]. Grows best in a woodland situation, young plants tolerate a reasonable level of shade[200]. Plants in this genus are notably resistant to honey fungus[200]. Note: *Tilia x vulgaris* B. Heyne is a synonym of *Tilia x europaea* L. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.2 *Tilia cordata*

Small Leaved Lime, Littleleaf linden

3 tlin 7 cyuc 5 kcaak 3 tcan 3 dwat 30 m hkc
hmimhtut cyutli tcup hwicli hras|lutnyik hpa7tli flatprikli-
wis hpa7tmwatli xre7t hjonli

drutta *Tilia cordata* is a deciduous Tree growing to 30 m (98ft) by 12 m (39ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to July, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pista If the flowers used for making tea are too old, they may produce symptoms of narcotic intoxication[4].

kcakta Edible Parts: Leaves SapEdible Uses: Chocolate TeaYoung leaves - raw[2]. They make an excellent salad or sandwich filling, they are mild tasting and somewhat mucilaginous[K]. The leaves can be available from spring until early autumn from the young growths at the base of the tree[K]. A very acceptable chocolate substitute can be made from a paste of the ground-up flowers and immature fruit. Trials on marketing the product failed because the paste is very apt to decompose[2, 115]. A popular herb tea is made from the flowers, it has a sweet, fragrant pleasant flavour[46]. Some caution is advised, see the notes above on toxicity. Sap - harvested in the spring, it is sweet and can be used as a drink or concentrated into a syrup[4].

tcanta Charcoal Fibre Paper WoodA fibre from the inner bark is used to make mats, shoes, baskets, ropes etc[1, 13, 14, 46, 61, 100]. It is also suitable for cloth[115]. It is harvested from trunks that are 15 - 30cm in diameter[115]. The fibre can also be used for making paper[189]. The stems are harvested in spring or summer, the leaves are removed and the stems steamed until the fibres can be stripped. The outer bark is removed from the inner bark by peeling or scraping. The fibres are cooked for 2 hours with lye and then beaten in a ball mill. The paper is beige in colour[189]. Wood - soft, white, easily carved. It is very suitable for carving domestic items and small non-durable items[4, 13, 46, 61, 115]. A charcoal made from the wood is used for drawing[46, 61, 115].

dwatta Antispasmodic Diaphoretic Expectorant Hypotensive Laxative Sedative SkinLime flowers are a popular domestic remedy for a number of ailments, especially in the treatment of colds and other ailments where sweating is desirable[9]. A tea made from the fresh or dried flowers is antispasmodic, diaphoretic, expectorant, hypotensive, laxative and sedative[4, 9, 13, 226, 238]. Lime flower tea is also used internally in the treatment of indigestion, hypertension, hardening of the arteries, hysteria, nervous vomiting or palpitation[4, 238]. The flowers are harvested commercially and often sold in health shops etc[226]. Lime flowers are said to develop narcotic properties as they age and so they should only be harvested when freshly opened[238]. A charcoal made from the wood is used in the treatment of gastric or dyspeptic disturbances and is also made into a powder then applied to burns or sore places[4].

nrakta Europe, including Britain, from Norway south and east to Spain, Siberia, Crimea and Caucasus. ksacta Woods on most fertile soils, especially limestone, it is commonly found on wooded limestone cliffs[17].

propta Seed - much of the seed produced in Britain is not viable, cut a few seedcases open to see if there is a seed inside[80]. If possible, obtain fresh seed that is ripe but has not as yet developed a hard seed coat and sow it immediately in a cold frame. It may germinate in the following spring though it could take 18 months[80]. Stored seed can be very slow to germinate. It has a hard seed coat, embryo dormancy and a hard coat on the pericarp. All these factors mean that the seed may take up to 8 years to germinate[80]. One way of shortening this time is to stratify the seed for 5 months at high temperatures (10°C at night, up to 30°C by day) and then 5 months cold stratification[80]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Layering in spring just before the leaves unfurl. Takes 1 - 3 years[78]. Suckers, when formed, can be removed with as much root as possible during the dormant season and replanted immediately[200].

nwatta Landscape Uses:Firewood, Pollard, Screen, Specimen, Street tree. Prefers a good moist loamy alkaline to neutral soil but it also succeeds on slightly acid soils[200]. Grows poorly on any very dry or very wet soil[200]. Tolerates considerable exposure[125, K]. Succeeds in sun or semi-shade[188]. Plants can be transplanted quite easily, even when large, trees up to 60 years old have been moved successfully[1, 74]. Trees are very amenable to coppicing or pollarding[186]. They produce numerous suckers from the base[98]. Suckers are produced but not freely according to another report[186]. This species produces far less suckers than *T. platyphyllos* or *T. x vulgaris*[238]. This species grows well in Britain, but it rarely produces viable seed in areas

with cool summers[200]. Lime trees tend to hybridise freely if other members of the genus are growing nearby[238]. If growing plants from seed it is important to ensure the seed came from a wild source or from an isolated clump of the single species[K]. Grows best in a woodland situation, young plants tolerate a reasonable level of side shade[186]. Mature trees cast a dense shade[186]. A very valuable bee plant, producing an abundance of nectar[186]. A valuable species for wildlife, there are 31 species of insects associated with this tree[24]. The leaves are very attractive to leaf aphid and these aphid produce an abundance of sweet secretions which drip off the leaves to the ground below and also attract sooty mould fungus[186]. This makes the tree unsuitable for street planting. This species, however, is less likely to become infested with aphid than *T. platyphyllos* or *T. x vulgaris*[238]. There are some named varieties selected for their ornamental value[188]. Plants in this genus are notably resistant to honey fungus[200]. Special Features:Not North American native, Fragrant flowers, Attractive flowers or blooms.

4.2.3 Ginkgo biloba

Maidenhair Tree, Ginkgo

3 tlin 8 cyuc 5 kcak 2 tcan 5 dwat 30 m hkuc
htuc cyuti hgatkyuctup hwicli hrasj|lutnyik hpa7tli flatprik|
wis hpa7tmwatli nyanhjen hjonli

drutta Ginkgo biloba is a deciduous Tree growing to 30 m (98ft) by 9 m (29ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from April to May, and the seeds ripen from October to November. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. It can tolerate atmospheric pollution.

pcista The seed contains a mildly acrimonious principle that is unstable when heated. It is therefore best to cook the seed before eating it to ensure any possible toxicity is destroyed. This acrimonious principle is probably 4'-methoxyppyridoxine, which can destroy vitamin B6[237]. It is more toxic for children, but the raw nuts would have to be eaten often over a period of time for the negative effects to become apparent[237]. Avoid if known allergy to Ginkgo or cross-react species (cashew, poison ivy). Not recommended for children. Avoid if on blood thinning medication (e.g. warfarin). Discontinue prior to surgery. Avoid parenteral use as possible hypotension, shock, dizziness. Excessive seed ingestion can cause 'gin-man' food poisoning [301].

kcakta Edible Parts: Oil Oil SeedEdible Uses: Oil OilSeed - raw (in small quantities), or cooked[237]. A soft and oily texture[229], the seed has a sweet flavour[2, 63] and tastes somewhat like a large pine nut[237]. The baked seed makes very pleasant eating, it has a taste rather like a cross between potatoes and sweet chestnuts[K]. The seed can be boiled and used in soups, porridges etc[183, 237]. It needs to be heated before being eaten in order to destroy a mildly acrimonious principle[57]. Another report says that the seed can be eaten raw[132] whilst another says that large quantities of the seed are toxic[218]. See the notes above on toxicity for more details[237]. The raw seed is said to have a fish-like flavour[218]. The seed is rich in niacin[160]. It is a good source of starch and protein, but is low in fats[237]. These fats are mostly unsaturated or monosaturated[237]. A more detailed nutritional analysis is available[218]. An edible oil is obtained from the seed[2, 183].

tcanta Oil Oil Soap WoodAn oil from the seed is used as a fuel in lighting[2]. A soap substitute is produced by mixing the pulp of the seed (is the fruit meant here?) with oil or wine[178]. Wood - light, soft, it has insect repelling qualities[117].

dwatta Antianxiety Antiasthmatic Antibacterial Antifungal Astringent Cancer Digestive Expectorant Infertility Ophthalmic Sedative Tonic Urinary VermifugeGinkgo has a long history of medicinal use in traditional Chinese medicine, where the seed is most commonly used. These uses are mentioned in more detail later. Recent research into the plant has discovered a range of medically active compounds in

the leaves and this has excited a lot of interest in the health-promoting potential of the plant[237]. In particular, the leaves stimulate the blood circulation and have a tonic effect on the brain, reducing lethargy, improving memory and giving an improved sense of well-being[237]. They have also been shown to be effective in improving peripheral arterial circulation[218, 237] and in treating hearing disorders such as tinnitus where these result from poor circulation or damage by free radicals[237]. The leaves contain ginkgolides, these are compounds that are unknown in any other plant species[238]. Ginkgolides inhibit allergic responses and so are of use in treating disorders such as asthma[238]. Eye disorders and senility have also responded to treatment[237]. The leaves are best harvested in the late summer or early autumn just before they begin to change colour. They are dried for later use[237, 238]. The fruit is antibacterial, antifungal, astringent, cancer, digestive, expectorant, sedative, vermifuge[117, 147, 176, 178]. The fruit is macerated in vegetable oil for 100 days and then the pulp is used in the treatment of pulmonary tuberculosis, asthma, bronchitis etc[218]. (This report might be referring to the seed rather than the fleshy fruit[K]). The cooked seed is antitussive, astringent and sedative[218]. It is used in the treatment of asthma, coughs with thick phlegm and urinary incontinence[176, 238]. The raw seed is said to have anticancer activity and also to be antivenous[176, 218]. It should be used with caution, however, due to reports of toxicity[176, 218]. The cooked seeds stabilize spermatogenesis[176].

nrakta E. Asia - N. China. ksacta Found wild in only 2 localities at Guizhou and on the Anhui/Zhejiang border[200], where it grows on rich sandy soils[147].

propta Seed - best sown as soon as it is ripe in a cold frame or in a sheltered outdoor bed[78, 80]. The seed requires stratification according to one report[78] whilst another says that stratification is not required[80] and that the seed can be sown in spring but that it must not have been allowed to dry out[80]. Germination is usually good to fair. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in the greenhouse for their first year. Plant them out into their permanent positions in the following spring[78, 80] and consider giving them some protection from winter cold for their first winter outdoors[K]. Softwood cuttings in a frame in spring[238]. Cuttings of half-ripe wood, July/August in a frame. The cutting may not grow away in its first year but usually grows all right after that[113]. Cuttings of mature wood, December in a frame[200].

nwatta Industrial Crop: Medicinal Management: Copice Management: Standard Minor Global Crop Staple Crop: Balanced carbLandscape Uses:Firewood, Pest tolerant, Specimen, Street tree. Succeeds in most soil types so long as they are well-drained[117, 200, 202], though it prefers a rather dry loam in a position sheltered from strong winds[11]. Some of the best specimens in Britain are found growing on soils over chalk or limestone[185]. Plants flower and fruit more reliably after hot summers or when grown in a warm sunny position[202]. Established plants are drought resistant[117], they also tolerate atmospheric pollution[117, 200]. Plants can grow in poor hard-packed soil, making the male forms good candidates for street planting[229]. Trees are often used for street planting in towns, only the males are used because the fruit from female plants has a nauseous smell. The fruit contains butanoic acid, it has the aroma of rancid butter[200]. Ginkgo is a very ornamental plant[1, 117] and there are several named forms[11, 200]. This species is the only surviving member of a family that was believed to be extinct until fairly recent times. It has probably remained virtually unchanged for at least 150 million years and might have been growing when the dinosaurs were roaming the earth[237]. It is exceptional in having motile sperm[185] and fertilization may not take place until after the seed has fallen from the tree[81]. This genus belongs to a very ancient order and has affinities with tree ferns and cycads[185]. The ginkgo is usually slow growing, averaging less than 30cm per year with growth taking place from late May to the end of August[185]. Growth is also unpredictable, in some years trees may not put on any new growth whilst in others there may be 1 metre of growth[185]. This variability does not seem to be connected to water or nutrient availability. Trees are probably long-lived in Britain, one of the original plantings (in 1758) is still growing and healthy at Kew (1993). Plants are not troubled by insects or diseases[132, 200], have they

evolved a resistance?[132]. Ginkgo is a popular food and medicinal crop in China, the plants are often cultivated for this purpose and are commonly grown in and around temples. Plants are either male or female, one male plant can pollinate up to 5 females. It takes up to 35 years from seed for plants to come into bearing[117]. Prior to maturity the sexes can often be distinguished because female plants tend to have almost horizontal branches and deeply incised leaves whilst males have branches at a sharper angle to the trunk and their leaves are not so deeply lobed[132]. Branches of male trees can be grafted onto female frees in order to fertilize them. When a branch from a female plant was grafted onto a male plant at Kew it fruited prolifically[11]. Female trees have often been seen in various gardens with good crops of fruit[K]. Seeds are marked by two or three longitudinal ridges, it is said that those with two ridges produce female plants whilst those with three ridges produce male plants[178]. Trees can be coppiced[200]. They can also be pruned into a fan-shape for growing on walls[202]. Another report says that the trees dislike pruning and will often die back as a result[238]. Special Features:Attractive foliage, Not North America native, Fragrant flowers, Inconspicuous flowers or blooms, Flowers have an unpleasant odor. The plant is heat tolerant in zones 9 through 3. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

4.2.4 Malus domestica

Apple

3 tlin 8 cyuc 5 kcac 4 tcan 2 dwat 9 m hkuc
hmimht cyutli tcup hwicli hrasjlutnykifrip hpa7tli flatprikli-
wis hpa7tmwvli xre7t hjonli

drudda Malus domestica is a deciduous Tree growing to 9 m (29ft 6in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from April to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista All members of this genus contain the toxin hydrogen cyanide in their seeds and possibly also in their leaves, but not in their fruits. Hydrogen cyanide is the substance that gives almonds their characteristic taste but it should only be consumed in very small quantities. Apple seeds do not normally contain very high quantities of hydrogen cyanide but, even so, should not be consumed in very large quantities. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit Oil OilEdible Uses: Oil Oil PectinFruit - raw, cooked or dried for later use. Apples are one of the most common and widely grown fruits of the temperate zone. There are a great many named varieties with differing flavours ranging from sour to sweet and textures from dry and mealy to crisp and juicy. There is also a wide range in the seasons of ripening with the first fruits being ready in late July whilst other cultivars are not picked until late autumn and will store for 12 months or sometimes more. See individual records for more details. The fruit of some cultivars is rich in pectin and can be used in helping other fruits to set when making jam etc[61, 142]. Pectin is also said to protect the body against radiation[201]. An edible oil can be obtained from the seed[4]. It would only really be viable to

Use these seeds as an oil source if the fruit was being used for some purpose such as making cider and then the seeds could be extracted from the remaining pulp[K].

taanta Lighting Oil Oil Pectin Teeth WoodThe fruit is a source of pectin[61, 142]. Pectin is used as a thickener in jams etc and as a culture medium in laboratories. The apple is also an excellent dentifrice, the mechanical action of eating a fruit serving to clean both the teeth and the gums[4, 269]. The oil from the seed has been used as an illuminant[269]. Wood - hard, compact, fine-grained. Used for turnery, tool handles, canes etc[46, 171, 226]. It makes an excellent fuel[226]. **Espalier:** tree or other plants that is trained to grow flat against a support (such as a trellis or wall).

dwatta Antibacterial Antidiarrhoeal Astringent Laxative Odontalgic StomachicThe fruit is astringent and laxative[4, 9]. The bark, and especially the root bark, is anthelmintic, refrigerant and soporific[218, 240]. An infusion is used in the treatment of intermittent, remittent and bilious fevers[4, 240]. The leaves contain up to 2.4% of an antibacterial substance called 'phloretin'[240]. This inhibits the growth of a number of gram-positive and gram-negative bacteria in as low a concentration as 30 ppm[240]. A ripe raw apple is one of the easiest foods for the stomach to deal with, the whole process of digestion taking about 85 minutes[4]. The apple juice will reduce the acidity of the stomach, it becomes changed into alkaline carbonates and thus corrects sour fermentation[4]. The apple is also an excellent dentifrice, the mechanical action of eating a fruit serving to clean both the teeth and the gums[4].

nrakta A hybrid of garden origin, mainly involving *M. sylvestris* and *M. pumila*[200]. **ksacta** Not known in a truly wild situation.

propta Seed - this species is a hybrid and will not breed true from seed, though some interesting new fruiting cultivars can be produced.. It is best sown as soon as it is ripe in the autumn in a cold frame. It usually germinates in late winter. Stored seed requires stratification for 3 months at 1°C and should be sown in a cold frame as soon as it is received[200]. It might not germinate for 12 months or more. Prick out the seedlings into individual pots as soon as they are large enough to handle. If given a rich compost they usually grow away quickly and can be large enough to plant out in late summer, though consider giving them some protection from the cold in their first winter. Otherwise, keep them in pots in a cold frame and plant them out in late spring of the following year. Cuttings of mature wood, November in a frame[11].

nwatta An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils, though if these are poorly drained there could be problems with diseases such as canker[200]. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. Tolerates a pH range from 6 to 7, preferring a range of 6.5 to 6.8[200]. The apple is one of the most commonly cultivated fruit crops in the temperate zone. The primary climatic requirements for the production of good quality fruit are warm summer temperatures, relative freedom from spring frosts, reasonable protection from the wind (especially cold north and east winds) and an evenly distributed rainfall of about 600 - 800mm per annum[200]. Good apple production has been achieved as far north as 65°, whilst about 1000 hours of winter temperatures below 7°C are necessary to initiate flower production[269]. However good quality apples can still be produced in other areas with careful management and choice of cultivars[200]. Even in tropical latitudes, the plant has succeeded at high elevations, producing fruit at elevations over 3000 metres in Ecuador for example[269]. Where space is at a premium, or at the limits of their climatic range, apples can be grown against a wall. Most cultivars will grow well against a sunny south or west facing wall, an east facing wall will suit many of the tougher cultivars and even a north facing wall can be used for early culinary cultivars[219]. A hybrid of mixed origins, including *M. dasycarpa*, *M. praecox*, *M. pumila*, *M. sieversii* and *M. sylvestris*, this species is very commonly cultivated in temperate areas for its edible fruit[11]. There are very many named varieties[46, 183, 200] and with careful choice of these varieties it is possible to provide freshly harvested fruit from July to December and stored fruit for the rest of the year. When chives (*Allium schoenoprasum*) or other alliums are grown

under apple trees it can prevent or cure scab[18]. A spray of the infused leaves of *Equisetum* spp can also be used against scab[18, 201]. If climbing nasturtiums (*Tropaeolum majus*) are grown into the tree they can repel woolly aphids[18, 201]. Apples lose their flavour if they are stored with potatoes[18]. They will also impart a bitter flavour to carrots or potatoes if they are stored in the same area[201]. Growing apples near potatoes makes the potatoes more susceptible to blight[201]. Wrapping maple leaves (*Acer* spp) around apples in store helps to preserve the apples[18, 20]. Apples store better if they are grown in a sward that contains a high percentage of clover[201]. Apple trees grow better and produce better quality fruit when foxgloves (*Digitalis* spp) and wallflowers (*Erysimum cheiri*) are growing in the orchard[201]. Dandelions (*Taraxacum* spp) produce ethylene gas and this can cause earlier ripening of the fruit if plants are growing in an orchard[18]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.5 *Malva moschata*

Musk Mallow

3 tlin 10 cyuc 5 kcaak 2 tcan 2 dwat m hkuc
hmimhtut cyutli tcup hwclli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli fyifxre7t hjonli

drutta *Malva moschata* is a PERENNIAL growing to 0.8 m (2ft 7in) by 0.6 m (2ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista When grown on nitrogen rich soils (and particularly when these are used inorganically), the plant tends to concentrate high levels of nitrates in its leaves[76]. The leaves are perfectly wholesome at all other times.

kackta Edible Parts: Flowers Leaves SeedEdible Uses: Leaves - raw or cooked[K]. A mild pleasant flavour[K]. The leaves are mucilaginous and fairly bland, we use them in bulk in summer salads[K]. They make a very good perennial substitute for lettuce in a salad, producing fresh leaves from spring until the middle of summer, or until the autumn from spring germinating plants[K]. Flowers - raw[K]. A very decorative addition to the salad bowl, they have a very mild flavour[K]. Seed - raw. Best used before it is fully mature, the seed has a pleasant nutty taste but it is rather small and fiddly to harvest[K].

taanta Dye FibreCream, yellow and green dyes can be obtained from the plant and the seed heads[168]. A fibre obtained from the stems is used for cordage, textiles and paper making[115].

dwatta Antiphlogistic Astringent Demulcent Diuretic Emollient Expectorant Laxative Poultice Salve UrinaryAll parts of the plant are antiphlogistic, astringent, demulcent, diuretic, emollient, expectorant, laxative, salve[4, 7, 9, 21, 46, 222, 238]. The leaves and flowers can be eaten as part of the diet, or a tea can be made from the leaves, flowers or roots[222]. The leaves and flowers are the main part used, their demulcent properties making them valuable as a poultice for bruise, inflammations, insect bites etc, or taken internally in the treatment of respiratory system diseases or inflammation of the digestive or urinary systems[4, 238]. They have similar properties, but are considered to be inferior, to the common mallow (*M. sylvestris*) and the marsh mallow (*Althaea officinalis*) and are seldom used internally[4]. The plant is an excellent laxative for young children[7].

nrakta Most of Europe, including Britain, south to N. Africa. **ksacta** Grassy places, pastures, hedgebanks etc, especially on rich soils, avoiding acid soils.

propta Seed - best sown in early spring in a cold frame. The seed germinates quickly and easily. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in their permanent positions in the early summer[K]. If you have sufficient seed then it

sown outdoors in situ in the middle to late spring. Basal cuttings in late spring. Harvest the shoots with plenty of underground stem when they are about 8 - 10cm above the ground. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer. Cuttings of side shoots, July/August in a cold frame[111].

nwatta Landscape Uses:Border A very easily grown plant, succeeding in ordinary garden soil[1], though it prefers a reasonably well-drained and moderately fertile soil in a sunny position[200]. Hardy to about -25°C[187]. A very ornamental plant[1]. It is very variable in form, especially with regard to the degree of laciniation of the leaves[17]. The crushed leaves have a musk-like smell[245]. Plants are generally quite short-lived though they can self-sow freely when in a suitable position and usually more than maintain themselves[233, K]. If the plant is pruned back to the main branches as it comes into flower, then it will produce a fresh flush of leaves in late summer for salad use[K]. A good plant for the summer meadow[24]. Plants seem to be immune to the predations of rabbits[233]. Prone to infestation by rust fungus[200]. **Special Features:** Attractive foliage, Edible, Fragrant foliage, Not North American native, Naturalizing. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. The plant growth habit is a clumper with limited spread [1-2].

4.2.6 Rosa rugosa

Ramanas Rose, Rugosa rose
3 tiin 9 cyuc 5 kcaac 3 tcan 2 dwat 2 m hkuc
hmmihtut cyutli kyuctup hwicli hrasjlutnyikfrip hpa7tli flat-
prikrlwis hpa7tmwatli fyfxre7t hjonli

drutta Rosa rugosa is a deciduous Shrub growing to 2 m (6ft) by 2 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower from June to August, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate maritime exposure.

pcista There is a layer of hairs around the seeds just beneath the flesh of the fruit. These hairs can cause irritation to the mouth and digestive tract if ingested.

kcakta Edible Parts: Flowers Fruit Seed Stem**Edible Uses:** TeaFruit - raw or cooked[1, 2, 62]. They are very sweet and pleasant to eat, though it takes quite a bit of patience to eat any quantity[K]. The fruit is a fairly large size for a rose with a relatively thick layer of flesh[K]. The fruit is about 25mm in diameter[200]. Rich in vitamin C[3, 14], containing up to 2.75% dry weight[74]. Some care has to be taken when eating this fruit, see the notes above on known hazards. Flowers - raw or cooked[183]. An aromatic flavour, they are also used in jellies and preserves[74, 183]. Remove the bitter white base of the petals before using them. Young shoots - cooked and used as a potherb[183]. Harvested as they come through the ground in spring and are still tender. The seed is a good source of vitamin E, it can be ground into a powder and mixed with flour or added to other foods as a supplement[102, 183]. Be sure to remove the seed hairs[102]. A pleasant tasting fruity-flavoured tea is made from the fruit, it is rich in vitamin C[21]. A tea is also made from the leaves[218].

tcanta Hedge HedgeThe plant makes a good low hedge[1, 29]. It is very tolerant of maritime exposure, but

is very bare in winter[K].

dwatta Cancer Hepatic Vitamin CThe leaves are used in the treatment of fevers[218]. The flowers act on the spleen and liver, promoting blood circulation[147, 218]. They are used internally in the treatment of poor appetite and digestion, and menstrual complaints arising from constrained liver energy[238]. The root is used in the treatment of coughs[218]. The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta E. Asia - N. China, Japan, Korea. Naturalized in several places in Britain[17]. **ksacta** Sandy sea shores[58].

propta Seed. Rose seed often takes two years to germinate. This is because it may need a warm spell of weather after a cold spell in order to mature the embryo and reduce the seedcoat[80]. One possible way to reduce this time is to scarify the seed and then place it for 2 - 3 weeks in damp peat at a temperature of 27 - 32°C (by which time the seed should have imbibed). It is then kept at 3°C for the next 4 months by which time it should be starting to germinate[80]. Alternatively, it is possible that seed harvested 'green' (when it is fully developed but before it has dried on the plant) and sown immediately will germinate in the late winter. This method has not as yet(1988) been fully tested[80]. Seed sown as soon as it is ripe in a cold frame sometimes germinates in spring though it may take 18 months. Stored seed can be sown as early in the year as possible and stratified for 6 weeks at 5°C[200]. It may take 2 years to germinate[200]. Prick out the seedlings into individual pots when they are large enough to handle. Plant out in the summer if the plants are more than 25cm tall, otherwise grow on in a cold frame for the winter and plant out in late spring. Cuttings of half-ripe wood with a heel, July in a shaded frame. Overwinter the plants in the frame and plant out in late spring[78]. High percentage[78]. Cuttings of mature wood of the current seasons growth. Select pencil thick shoots in early autumn that are about 20 - 25cm long and plant them in a sheltered position outdoors or in a cold frame[78, 200]. The cuttings can take 12 months to establish but a high percentage of them normally succeed[78]. Division of suckers in the dormant season. Plant them out direct into their permanent positions. Layering. Takes 12 months[11].

nwatta Prefers a light well-drained soil but succeeds in most soils including dry ones[11, 14, 200]. Grows well in heavy clay soils[200]. Prefers a circumneutral soil and a sunny position[200]. Dislikes water-logged soils[200]. Tolerates maritime exposure[14, K]. Plants are said to withstand temperatures down to -50°C without damage[160]. The foliage is said to resist disease[11]. A very ornamental plant[1], it suckers freely but these are fairly easily controlled[K]. There are a number of named varieties[11]. 'Scabrosa' is said to be larger in all its parts, including the fruit[200], though it has not proved to be much larger with us[K]. The flowers have a clove-like perfume[245]. Grows well with alliums, parsley, mignonette and lupins[18, 20]. Dislikes boxwood[18]. Garlic planted nearby can help protect the plant from disease and insect predation[18, 20]. Hybridizes freely with other members of this genus[80]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.7 Foeniculum vulgare

Fennel, Sweet fennel

3 tlin 10 cyuc 5 kcak 4 tcan 3 dwat 1.5 m hkuc

htut cyutli hgatkuyctcup hwicli hrasjlutnyik hpa7tli flatpriklwis hpa7tmwatli fyifkre7t hjonli

drutta Foeniculum vulgare is an evergreen Perennial growing to 1.5 m (5ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf all year, in flower from August to October, and the seeds ripen from September to October. The species is thermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista Skin contact with the sap or essential oil is said to cause photo-sensitivity and/or dermatitis in some people[218, 222]. Ingestion of the oil can cause vomiting, seizures and pulmonary oedema[222]. Avoid for small children. Avoid if cirrhosis/liver disorders. Diabetics check sugar content of preparation [301].

kcakta Edible Parts: Flowers Leaves Oil Root Seed StemEdible Uses: Condiment Drink Oil TeaLeaves - raw or cooked[2, 4, 5, 9, 27]. A delicious aniseed flavour[183], the young leaves are best since older ones soon become tough[K]. They are often used as a garnish on raw or cooked dishes and make a very pleasant addition to salads[183]. They help to improve digestion and so are particularly useful with oily foods[244]. The leaves are difficult to store dried[200], though this does not really matter since they can often be harvested all year round, especially if the plants are in a warm, sheltered position[K]. Leaf stalks and flower heads - raw or cooked[14, 37, 52, 183]. A similar aniseed flavour to the leaves[K]. The aromatic seeds are used as a flavouring in cakes, bread, stuffings etc[2, 4, 5, 21, 27, 183]. They have a similar flavour to the leaves[K] and also improve the digestion[244]. The sprouted seeds can be added to salads[183]. An essential oil from the fully ripened and dried seed is used as a food flavouring in similar ways to the whole seed[1, 46, 183, 245]. Root - cooked[53]. Somewhat parsnip-like. The leaves or the seeds can be used to make a pleasant-tasting herbal tea[16, 183].

tcanta Dye Essential Oil Repellent StrewingThe seed yields up to 5% of an essential oil[1, 4, 46]. This is used medicinally, as a food flavouring, in toothpastes, soaps, perfumery, air fresheners etc[1, 46, 238]. The flavour of fennel oil depends upon its two main constituents. 'Fenchone' is a bitter tasting element whilst 'anethole' has a sweet anise-like flavour[238]. The proportions of these two ingredients varies according to strain and region. Plants growing in the Mediterranean and southern Europe usually have a sweet oil whilst plants growing in central and northern Europe usually produce a more bitter oil[238]. The quality of the oil also depends upon how well the seed has been dried - the oil from fully ripened and dried seeds being much sweeter and more fragrant[245]. The dried plant is an insect repellent[14, 53], the crushed leaves are effective for keeping dogs free of fleas[201]. The plant was formerly used as a strewing herb[201]. Yellow and brown dyes are obtained from the flowers and leaves combined[168].

dwatta Analgesic Antiinflammatory Antispasmodic Aromatherapy Aromatic Carminative Diuretic Emmenagogue Expectorant Galactagogue Hallucinogenic Stimulant Stomachic UrinaryFennel has a long history of herbal use and is a commonly used household remedy, being useful in the treatment of a variety of complaints, especially those of the digestive system[244]. The seeds, leaves and roots can be used, but the seeds are most active medicinally and are the part normally used[4]. An essential oil is often extracted from the fully ripened and dried seed for medicinal use, though it should not be given to pregnant women[4, 238]. The plant is analgesic, anti-inflammatory, antispasmodic, aromatic, carminative, diuretic, emmenagogue, expectorant, galactagogue, hallucinogenic, laxative, stimulant and stomachic[4, 7, 9, 21, 147, 165, 176, 192, 238]. An infusion is used in the treatment of indigestion, abdominal distension, stomach pains etc[254]. It helps in the treatment of kidney stones and, when combined with a urinary disinfect-

tant like Arctostaphylos uva-ursi, makes an effective treatment for cystitis[254]. It can also be used as a gargle for sore throats and as an eyewash for sore eyes and conjunctivitis[254]. Fennel is often added to purgatives in order to allay their tendency to cause gripe, and also to improve the flavour[4]. An infusion of the seeds is a safe and effective cure for wind in babies[244]. An infusion of the root is used to treat urinary disorders[238]. An essential oil obtained from the seed is used in aromatherapy. Its keyword is 'Normalising'[210]. The essential oil is bactericidal, carminative and stimulant[218]. Some caution is advised, see notes above on toxicity[222]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve Foeniculum vulgare for cough, bronchitis, dyspeptic complaints (see [302] for critics of commission E).

nrakta S. Europe. Naturalized in Britain. ksacta Found most often in dry stony calcareous soils near the sea[1, 16, 190].

propta Seed - best sown in early spring in situ[1]. The seed can also be sown in situ in the autumn[4, 37]. In many gardens it self sows freely. Division in March as the new growth appears[16, 200]. The plants are very tolerant of disturbance, we have found divisions to take well at any time of the year, though these divisions are never as good as seed-sown plants[K].

nwatta An easily grown plant, it succeeds in most soils but prefers a sunny dry position[4, 16, 37, 200]. It grows well in sandy soils[188] and is drought tolerant once established[190]. Plants often self-sow freely in the garden[K]. Plants can be grown in quite coarse grass, which can be cut annually in the autumn[233]. Although hardy in most parts of Britain, plants are liable to die out over the winter if the soil is not well-drained or the weather is persistently cold and wet[238]. Fennel is often cultivated in the herb garden for its edible and medicinal uses, there are some named varieties[183]. Especially in mild winters, the leaves can be available all year round[K]. It is best to cut a few plants back to ground level occasionally during the growing season, thus ensuring a constant supply of fresh young shoots[4]. In a dry summer make sure that you water the cut-down clump or it might not regrow that year[K]. Fennel is also grown commercially as a medicinal plant and for its essential oil[4, 238]. Fennel is in general a poor companion plant in the garden. It inhibits the growth of nearby plants, especially beans, tomatoes and kohlrabi[14, 18]. It is itself inhibited by wormwood and coriander[14, 18]. However, the flowering plant attracts beneficial insects such as bees, parasitic wasps, tachinid flies and hoverflies to the garden. The presence of these creatures will help to maintain a natural balance of insects in the garden and help prevent infestations by aphids etc[238]. It is best not to grow fennel and dill (*Anethum graveolens*) close to each other since hybridisation can occur and the resulting seedlings will be of indeterminate flavour[238]. The plant is heat tolerant in zones 9 through 6. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2].

4.2.8 Urtica dioica

Stinging Nettle, California nettle

3 tlin 10 cyuc 5 kcak 4 tcan 5 dwat 1.2 m hkuc

hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatpriklwis hpa7tmwatli nyanhjen hjonli

drutta Urtica dioica is a PERENNIAL growing to 1.2 m (4ft) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in leaf from March to November, in flower from May to October, and the seeds ripen from June to October. The species is dioecious (individual flowers are either male or female, but

any one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Wind. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista The leaves of the plants have stinging hairs, causing irritation to the skin[21, 200]. This action is neutralized by heat or by thorough drying, so the cooked leaves are perfectly safe and nutritious[200]. However, only young leaves should be used because older leaves develop gritty particles called cystoliths which act as an irritant to the kidneys[172]. Possible interference with allopathic drugs for diabetes mellitus, hypertension. Central nervous system depression drugs (e.g. morphine, alcohol) may also interact with nettle. Avoid during pregnancy [301].

kcakta Edible Parts: Leaves Oil**Edible Uses:** Colouring Curdling agent Drink Oil**Young leaves** - cooked as a potherb and added to soups etc[1, 2, 9, 12, 13, 36, 183]. They can also be dried for winter use[12]. Nettles are a very valuable addition to the diet[244], they are a very nutritious food that is easily digested and is high in minerals (especially iron) and vitamins (especially A and C)[4, 201, 238]. Only use young leaves (see the notes above on toxicity) and wear stout gloves when harvesting them to prevent being stung. Cooking the leaves, or thoroughly drying them, neutralizes the sting, rendering the leaf safe to eat[4, 244]. The young shoots, harvested in the spring when 15 - 20cm long complete with the underground stem are very nice[85]. Old leaves can be laxative[5]. The plants are harvested commercially for extraction of the chlorophyll, which is used as a green colouring agent (E140) in foods and medicines[238]. A tea is made from the dried leaves, it is warming on a winters day[21, 183]. A bland flavour, it can be added as a tonic to China tea[238]. The juice of the leaves, or a decoction of the herb, can be used as a rennet substitute in curdling plant milks[183]. Nettle beer is brewed from the young shoots[200].

tcanta Biomass Compost Dye Fibre Hair Liquid feed Oil Repellent WaterproofingA strong flax-like fibre is obtained from the stems[200]. Used for making string and cloth[1, 4, 6, 13, 36], it also makes a good quality paper[115]. It is harvested as the plant begins to die down in early autumn and is retted before the fibres are extracted[4, 99]. The fibre is produced in less abundance than from flax (*Linum usitatissimum*) and is also more difficult to extract[4]. The plant matter left over after the fibres have been extracted are a good source of biomass and have been used in the manufacture of sugar, starch, protein and ethyl alcohol[4]. An oil obtained from the seeds is used as an illuminant[4]. An essential ingredient of 'QR' herbal compost activator[32]. This is a dried and powdered mixture of several herbs that can be added to a compost heap in order to speed up bacterial activity and thus shorten the time needed to make the compost[K]. The leaves are also an excellent addition to the compost heap[12, 18, 20] and they can be soaked for 7 - 21 days in water to make a very nutritious liquid feed for plants[54]. This liquid feed is both insect repellent and a good foliar feed[14, 18, 53]. The growing plant increases the essential oil content of other nearby plants, thus making them more resistant to insect pests[18, 20, 54]. Although many different species of insects feed on nettles, flies are repelled by the plant so a bunch of freshly cut stems has been used as a repellent in food cupboards[4]. The juice of the plant, or a decoction formed by boiling the herb in a strong solution of salt, will curdle milks and thus acts as a rennet substitute[4]. This same juice, if rubbed into small seams of leaky wooden tubs, will coagulate and make the tub watertight again[4]. A hair wash is made from the infused leaves and this is used as a tonic and antidandruff treatment[172, 201]. A beautiful and permanent green dye is obtained from a decoction of the leaves and stems[4, 115]. A yellow dye is obtained from the root when boiled with alum[4, 115]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Antihistamic Antidandruff Antirheumatic Antiseborrheic Astringent Diuretic Eczema Galactagogue Haemostatic Hypoglycaemic Stings Tonic Urinary**Nettles** have a long history of use in the home as a herbal remedy and nutritious addition to the diet[K]. A tea made from the leaves has traditionally been used as a cleansing tonic

and blood purifier so the plant is often used in the treatment of hay fever, arthritis, anaemia etc[254]. The whole plant is antiasthmatic, antidandruff, astringent, depurative, diuretic, galactagogue, haemostatic, hypoglycaemic and a stimulating tonic[4, 9, 21, 36, 165, 238]. An infusion of the plant is very valuable in stemming internal bleeding[4], it is also used to treat anaemia, excessive menstruation, haemorrhoids, arthritis, rheumatism and skin complaints, especially eczema[238]. Externally, the plant is used to treat skin complaints, arthritic pain, gout, sciatica, neuralgia, haemorrhoids, hair problems etc[238]. The fresh leaves of nettles have been rubbed or beaten onto the skin in the treatment of rheumatism etc[257]. This practice, called unctionification, causes intense irritation to the skin as it is stung by the nettles. It is believed that this treatment works in two ways. Firstly, it acts as a counter-irritant, bringing more blood to the area to help remove the toxins that cause rheumatism. Secondly, the formic acid from the nettles is believed to have a beneficial effect upon the rheumatic joints. For medicinal purposes, the plant is best harvested in May or June as it is coming into flower and dried for later use[4, 238]. This species merits further study for possible uses against kidney and urinary system ailments[222]. The juice of the nettle can be used as an antidote to stings from the leaves and an infusion of the fresh leaves is healing and soothing as a lotion for burns[4]. The root has been shown to have a beneficial effect upon enlarged prostate glands[254]. A homeopathic remedy is made from the leaves[4]. It is used in the treatment of rheumatic gout, nettle rash and chickenpox, externally is applied to bruises[4]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Urtica dioica* Stinging Nettle for rheumatic ailments (internal use of leaf), irrigation therapy, for inflammatory disease of the lower urinary tract and prevention of kidney 'gravel' formation, urination difficulty from benign prostatic hyperplasia (root) (see [302] for critics of commission E).

nrakta Temperate regions throughout the world, including Britain. The plant has become naturalized at higher elevations in the Tropics. **ksacta** Waste ground, hedgerows, woods etc, preferring a rich soil and avoiding acid soils[4, 9].

propta Seed - sow spring in a cold frame, only just covering the seed. Prick out the seedlings into individual pots when they are large enough to handle, and plant them out in the summer. Division succeeds at almost any time in the growing season. Very easy, plant them straight out into their permanent positions.

nwatta Industrial Crop: Fiber Management: Hay Regional Crop Staple Crop: Protein**Prefers** a soil rich in phosphates and nitrogen. Plants must be grown in a deep rich soil if good quality fibre is required[4, 115]. Nettles are one of the most undervalued of economic plants. They have a wide range of uses, for food, medicines, fibres etc and are also a very important plant for wildlife. There are at least 30 species of insects that feed on it and the caterpillars of several lepidoptera species are dependant upon it for food[30]. Especially when growing in rich soils, the plant can spread vigorously and is very difficult to eradicate. It is said that cutting the plant down three times a year for three years will kill it[4]. It is a good companion plant to grow in the orchard and amongst soft fruit[53, 54]. So long as it is not allowed to totally over-run the plants, it seems to improve the health of soft fruit that grows nearby and also to protect the fruit from birds, but it makes harvesting very difficult. Dioecious. Male and female plants must be grown if seed is required. The plant is heat tolerant in zones 10 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is rhizomatous with under-

ground stems sending roots and shoots along their length [1-2].

4.2.9 *Secale strictum*

Mountain Rye

3 tlin 7 cyuc 5 kcaak 0 tcan 0 dwat 1.2 m hkuc
htut cyutli hgattcup hwicli hrasjlutnyik hpa7tli flatprikliwis
hpa7tmwatli xre7t hjonli

drutta *Secale strictum* is a PERENNIAL growing to 1.2 m (4ft) by 0.3 m (1ft in). See above for USDA hardness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Seed Edible Uses: Seed - used as a whole grain or ground into a flour and used for making bread etc[46, 177, 183]. Somewhat smaller than the seed of *S. cereale* but produced abundantly. It is relatively difficult to extract the seed from the glumes by hand[K].

nrakta Europe - Mediterranean to northern Africa and western Asia. ksacta Dry stony or rocky mountain sides.

propta Seed - sow March or October in situ and only just cover the seed. Germination should take place within 2 weeks. If the seed is in short supply, it can be grown in pots in the greenhouse or cold frame in early spring. Only just cover the seed. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant them out in late spring or early summer. Division in spring. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta Succeeds in most soils but prefers a well-drained light soil in a sunny position[1]. One report says that it requires protection from severe frosts[1], though our experience is that it is hardy in most parts of the country[K]. Mountain rye is occasionally cultivated for its edible seed[61], it is possibly a parent of the cultivated Rye, *S. cereale*[57]. This species has an excellent potential as a perennial cereal crop in temperate zones. Although the seed is somewhat smaller than the cultivated annual rye, it is produced abundantly, especially from the second year onwards. The plant tillers well, especially in its second and subsequent years, and the ears in selected varieties can be 25cm long[K]. Not all forms of this species are perennial, the subspecies *S. strictum kuprijanovii*. Gross. is reliably so[46].

4.2.10 *Hemerocallis fulva*

Common Day Lily, Orange daylily, Tawny Daylily, Double Daylily

3 tlin 10 cyuc 5 kcaak 2 tcan 2 dwat 1 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flat-
prikliwis hpa7tmwatli dyatxre7t hjonli

drutta *Hemerocallis fulva* is a PERENNIAL growing to 1 m (3ft 3in) by 1 m (3ft 3in) at a medium rate. See above for USDA hardness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to August. The species is hermaphrodite (has both male and female organs). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic[127, 137]. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcakta Edible Parts: Flowers Leaves Root Shoots Edible Uses: Leaves and young shoots - cooked[85, 116, 179, 183]. An asparagus or celery substitute. An excellent sweet tasting vegetable[179, K], though some caution is recommended[127, 137]. The leaves need to be eaten whilst still

very young since they quickly become fibrous[K]. Flowers - raw or cooked[62, 100]. The petals are thick and crunchy, making very pleasant eating raw, with a nice sweetness at the base because of the nectar[K]. The flowers can also be dried and used as a thickener in soups etc[62, 183]. In this case, they are picked when somewhat withered and closed[85]. A rich source of iron[218]. Flower buds - raw or cooked[62, 100, 105, 116]. A pea-like flavour[85]. Can be dried and used as a relish[178]. The dried flower contains about 9.3% protein. 25% fat!?, 60% carbohydrate (rich in sugar), 0.9% ash. It is rich in vitamin A[179]. Tubers - raw or cooked[183]. A nutty flavour[62]. Young tubers are best, though the central portion of older tubers is also good[85].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205]. Plants form a spreading clump and are suitable for ground cover when spaced about 90cm apart each way[208]. The dead leaves should be left on the ground in the winter to ensure effective cover[208]. The cultivar 'Kwanso Flore Pleno' has been especially mentioned[208].

dwatta Anodyne Anthelmintic Antidote Antiemetic Antispasmodic Blood purifier Cancer Depurative Diuretic Febrifuge Laxative Sedative Diuretic, febrifuge, laxative (mild)[62, 178, 205]. The flowers are anodyne, antiemetic, antispasmodic, depurative, febrifuge and sedative[218]. In China they are used as an anodyne for women in childbirth[240]. An extract of the flowers is used as a blood purifier[240]. The rhizome has shown antimicrobial activity, it is also tuberculostatic and has an action against the parasitic worms that cause filariasis[279]. It is used in Korea to treat opelmatia, jaundice, constipation and pneumonia[279]. The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. The root also has a folk history of use in the treatment of cancer - extracts from the roots have shown antitumour activity[218]. A tea made from the boiled roots is used as a diuretic[205, 218].

nrakta Of uncertain origin. A garden escape in Britain. ksacta Common and widespread in the wild[205], probably as an escape from cultivation.

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Landscape Uses: Border, Erosion control, Ground cover, Massing. Succeeds in most soils[1], including dry ones, though it prefers a rich moist soil[111] and a sunny position but tolerating partial shade[88, 111]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. This species is hardy to about -20°C[187]. Plants take a year or two to become established after being moved[200]. The roots have spindle-shaped swellings and spread freely, the plant can become invasive[205]. A very ornamental plant[1], it is cultivated in China and Japan for its edible flowers and leaves, there are many named varieties[200]. Individual flowers are short-lived, opening in the morning and withering in the evening. The plant, however, produces a succession of flowers over a period of about 6 weeks[205]. The sterile cultivar 'Kwanso' has double flowers, it has been especially mentioned for these flowers which are said to be crunchy with a nutty aftertaste[137]. 'Flore Pleno' is another form with double-flowers that have a delicious taste[K]. The sterile cultivar 'Europa' is very vigorous, with long stolons, and each piece of root is capable of growing into a new plant[205]. This cultivar, which is the form usually supplied from nurseries, succeeds in lawns and has even been known to grow through tarmac[205]. Hybridizes freely with other members of this genus[200]. Many forms of this plant are sterile triploids, probably of garden origin, and do not set seed[205]. The pollen, however, is fertile and can be used to fertilize other plants[205]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. Special Features: Naturalizing, Attracts butterflies, Suitable

for cut flowers, Attractive flowers or blooms. The plant is heat tolerant in zones 12 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

4.2.11 *Lepidium* spp.

Perennial Lepidium
 3 tlin 10 cyuc 5 kcaok 0 tcan 3 dwat 1.2 m hkuc
 hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikhwis hpa7tmwlati hjonli
 drutta *Lepidium* spp. is a PERENNIAL growing to 1.2 m (4ft) by 2 m (6ft 7in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.
 kckaak Edible Parts: Leaves RootEdible Uses: Carbon Farming Solutions - Staple Crop: oil (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1]. Fruit is usually spreading and squat (less than 3 times as long as broad),
 tcanta See individual species.
 dwatta Various medicinal qualities depending on the species.
 nrakta Origin: N. Temperate. Widely distributed in the Americas, Africa, Asia, Europe, and Australia. ksacta Various depending on the species.
 propta See individual species.
 nwatta Management: Standard Staple Crop: Oil Under DevelopmentClimate: boreal to warm temperate. Humidity: semi-arid to humid. A genus of plants in the mustard/cabbage family, Brassicaceae. Annual to perennial, herbs or shrubs. Species include garden cress, maca, and dittander. *Lepidium* is from the Greek *lepis* (scale) referring to the shape of the seed pods. Carbon Farming Solutions - Cultivation: under development. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

4.2.12 *Secale* hybrids

Perennial cereal rye
 3 tlin 9 cyuc 5 kcaok 4 tcan 1 dwat 1.8 m hkuc
 htut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikhwis hpa7tmwlati hjonli
 drutta *Secale* hybrids is a PERENNIAL growing to 1.8 m (6ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.
 kckaak Edible Parts: Oil SeedEdible Uses: OilCarbon Farming Solutions - Staple Crop: balanced carb (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1]. A minor or regional perennial crop in production with low or unreported yields [1-1]. Perennial hybrids are now under development. Wild perennial species found in Turkey , for example, *Secale monatum* Guss var. *anatolicum* Boiss and *Secale montanum* Guss var. *vavilovi* Grossh. have a larger stature, high frost resistance, strong tillering ability, and tolerance to poor soils

and drought. Understanding wild plant species is becoming important in the development of new hybrid crops.

tcanta OilMany including Biomass; Green manure; Oil; Soil stabilization; and Thatching.
 dwatta Possible. For example *Secale cereale* seed is made into a poultice and applied to tumours[218]. The seed is also an effective laxative due to its fibrous seed coat[269].
 nrakta Origin: recent hybrid origin. ksacta Hybrid propta Seed. Division.
 nwatta Management: Standard Staple Crop: Balanced carb Under DevelopmentClimate: boreal to warm temperate, Mediterranean. Humidity: semi-arid to humid. Carbon Farming Solutions - Cultivation: under development perennial hybrids. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

4.2.13 *Althaea officinalis*

Marsh Mallow, Common marshmallow
 3 tlin 7 cyuc 5 kcaok 3 tcan 5 dwat 1.2 m hkuc
 htut cyutli kyucup hwicli hrasljutnyik hpa7tli flatprikhwisom hpa7tmwlati fyifxre 7t hjonli
 drutta *Althaea officinalis* is a PERENNIAL growing to 1.2 m (4ft) by 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in saline soils. It cannot grow in the shade. It prefers dry or moist soil.
 pcista No documented adverse effects but anecdotal reports allergic reaction and lower blood sugar.
 kckaak Edible Parts: Leaves Oil RootEdible Uses: Egg Oil TeaLeaves - raw or cooked[2, 4, 100]. They are used as a potherb or to thicken soups[62, 183]. When used as a small proportion with other leaves, the taste and texture is acceptable, but if a lot of the leaves are cooked together their mucilaginous texture makes them unpalatable[K]. The leaves can be eaten raw but are rather fibrous and somewhat hairy, though the taste is mild and pleasant[K]. We have found them to be quite acceptable in salads when chopped up finely[K]. Root - raw or cooked[61]. When boiled and then fried with onions it is said to make a palatable dish that is often used in times of shortage[4]. The root is used as a vegetable[62, 141, 183], it is also dried then ground into a powder, made into a paste and roasted to make the sweet 'marshmallow'[4, 5, 7, 17, 61]. The root contains about 37% starch, 11% mucilage, 11% pectin[254]. The water left over from cooking any part of the plant can be used as an egg-white substitute in making meringues etc[62]. The water from the root is the most effective[183], it is concentrated by boiling until it has a similar consistency to egg white. A tea is made from the flowers[183]. A tea can also be made from the root[183].
 tcanta Adhesive Fibre Oil TeethThe dried root is used as a toothbrush or is chewed by teething children[6, 7]. It has a mechanical affect on the gums whilst also helping to ease the pain. The root is also used as a cosmetic, helping to soften the skin[7]. A fibre from the stem and roots is used in paper-making[46, 61, 74, 115]. The dried and powdered root has been used to bind the active ingredients when making pills for medicinal use[268]. A glue can be made from the root[74]. The root is boiled in water until a thick syrup is left in the pan, this syrup is used as a glue. An oil from the seed is used in making paints and varnishes[74].
 dwatta Antidiarrhoeal Antitussive Demulcent Diuretic Emollient Laxative Odontalgic UrinaryMarsh mallow is a very useful household medicinal herb. Its soothing demulcent properties make it very effective in treating inflammations and irritations of the mucous membranes such as the alimentary canal, the urinary and the respiratory organs[4, 254]. The root counters excess stomach acid, peptic ulceration and gastritis[254]. It is also applied externally to bruises, sprains, aching muscles, insect bites, skin inflammations, splinters etc[4, 238]. The whole plant, but especially the root, is antitussive, demulcent, diuretic, highly emollient, slightly laxative and odontalgic[4, 17, 21, 46, 165]. An infusion of the leaves is used to treat cystitis and frequent urination[254]. The leaves are harvested in August when the

just coming into flower and can be dried for later use[4]. The root can be used in an ointment for treating boils and abscesses[254]. The root is best harvested in the autumn, preferably from 2 year old plants, and is dried for later use[238]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Althaea officinalis* Marsh Mallow for irritation of mouth and throat and associated dry cough/bronchitis (Root and leaf), mild stomach lining inflammation (root) (see [302] for critics of commission E).

nrakta Central and southern Europe, including Britain, to N. Africa and W. Asia. ksacta The upper margins of salt and brackish marshes, sides of ditches and grassy banks near the sea[7, 17].

propta Seed - sow spring or autumn in a cold frame. The seed is best sown as soon as it is ripe in late summer; the germination is often erratic[238]. Stratification can improve germination rates and time. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer[K]. Division in spring or autumn. Fairly easy, it is best to pot up the divisions in a lightly shaded position in a cold frame or greenhouse until they are growing away well and then plant them out into their permanent positions. Root cuttings in December.

nwatta Succeeds in almost any soil and situation[1, 4, 200], though it prefers a rich moist soil in a sunny position[4, 200]. It also tolerates fairly dry soil conditions[1]. Plants are hardy to about -25°C[187]. Marsh mallow is often cultivated in the herb garden, as a culinary and medicinal herb as well as for ornament[61]. Its roots were at one time the source of the sweet 'marsh mallow', but this sweet is now made without using the plant[4]. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc.) and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

4.2.14 *Secale strictum kuprijanovii*

3 tlin 7 cyuc 5 kcaak 0 tcan 0 dwat 1.2 m hkuc
htut cywtli hqattc hwclli hrasjlutnyik hpa7tli flatprik
lwis hpa7tmwatli nyanhjen hjonli

drutta *Secale strictum kuprijanovii* is a PERENNIAL growing to 1.2 m (4ft). See above for USDA hardness. It is hardy to UK zone 3 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought.

kcakta Edible Parts: Seed Edible Uses: Seed - used as a whole grain or ground into a flour and used for making bread etc[46, 177, 183]. Somewhat smaller than the seed of *S. cereale* but produced abundantly. It is relatively difficult to extract the seed from the glumes by hand[K].

nrakta W. Asia - Caucasus. ksacta Mountain meadows[74].

propta Seed - sow March or October in situ and only just cover the seed. Germination should take place within 2 weeks. If the seed is in short supply, it can be grown in pots in the greenhouse or cold frame in early spring. Only just cover the seed. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant them out in late spring or early summer. Division in spring. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta Succeeds in most soils but prefers a well-drained light soil in a sunny position[1]. One report says that it requires protection from severe frosts[1], though our experience is that it is hardy in most parts of the country[K]. Occasionally cultivated for its edible seed[61], it is possibly a parent of the cultivated Rye, *S. cereale*[57]. This species has an excellent potential as a perennial cereal crop in temperate zones. Although the seed is somewhat smaller than the cultivated annual rye, it is produced abundantly, especially from the second year onwards. The plant tillers well, especially in its second and subsequent years, and the ears in selected varieties can be 25cm long[K]. This subspecies is reliably perennial[46].

4.2.15 *Rumex acetosa*

Sorrel, Garden sorrel

3 tlin 7 cyuc 5 kcaak 4 tcan 3 dwat 0.6 m hkuc
hmimhtut cywtli tcup hwclli hrasjlutnyik hpa7tli frusflatprik
lwis hpa7tmwatli nyanhjen hjonli

drutta *Rumex acetosa* is a PERENNIAL growing to 0.6 m (2ft) by 0.3 m (1ft in). See above for USDA hardness. It is hardy to UK zone 3 and is not frost tender. It is in leaf all year, in flower from May to June, and the seeds ripen from June to August. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Wind. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Plants can contain quite high levels of oxalic acid, which is what gives the leaves of many members of this genus an acid-lemon flavour. Perfectly alright in small quantities, the leaves should not be eaten in large amounts since the oxalic acid can lock-up other nutrients in the food, especially calcium, thus causing mineral deficiencies. The oxalic acid content will be reduced if the plant is cooked. People with a tendency to rheumatism, arthritis, gout, kidney stones or hyperacidity should take especial caution if including this plant in their diet since it can aggravate their condition[238].

kcakta Edible Parts: Flowers Leaves Root Seed Edible Uses: Curdling agent Leaves - raw or cooked[2, 4, 5, 7, 13, 27]. They make a thirst-quenching on their own, or can be added to salads, used as a potherb or pureed and used in soups[183]. A delicious lemon-like flavour, liked by most people who try them, they can be rather overpowering in quantity and are more generally used as a flavouring in mixed salads[K]. The leaves can also be dried for later use[12]. The leaves can be available all through the winter, especially in mild weather or if a little protection is given to the plants[K]. The leaves should be used sparingly in the diet[9, 21], see the notes on toxicity above. Flowers - cooked as a vegetable or used as a garnish[183]. Root - cooked. It is dried, ground into a powder and made into noodles[105]. Seed - raw or cooked[172]. Ground into a powder and mixed with other flours to make bread[183]. The seed is easy to harvest, but is rather small and fiddly to use[K]. The juice of the leaves can be used as a curdling agent for milks[4, 183].

tcanta Cleanser Dye Polish Dark green to brown and dark grey dyes can be obtained from the roots, they do not make a mordant[168]. A grey-blue dye is obtained from the leaves and stems[106]. An infusion of the stems is used as a polish for bamboo and wicker furniture and also for silver[53, 238]. The juice of the plant removes stains from linen[14] and also ink stains (but not ball-point ink) from white material[53, 238]. It is sometimes sold as 'essential salt of lemon'[4]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Anthelmintic Antiscorbutic Astringent Depurative Diuretic Febrifuge Homeopathy Laxative Refrigerant Stomachic The fresh or dried leaves are astringent, diuretic, laxative and refrigerant[4, 7, 14, 21, 238]. They are used to make a cooling drink in the treatment of fevers and are especially useful in the treatment of scurvy[4]. The leaf juice, mixed with fumitory, has been used as a cure for itchy skin and ringworm[4]. An infusion of the root is astringent, diuretic and haemostatic[4, 7, 14, 21, 218]. It has been used

the treatment of jaundice, gravel and kidney stones[4]. Both the roots and the seeds have been used to stem haemorrhages[4]. A paste of the root is applied to set dislocated bones[272]. The plant is depurative and stomachic[7, 14, 21, 218]. A homeopathic remedy is made from the plant[9]. It is used in the treatment of spasms and skin ailments[9].

nrakta Most of Europe, including Britain, temperate Asia, N. America, Greenland. ksacta Meadows, by streams and in open places in woodland[7, 17]. Often found as a weed of acid soils[1].

propta Seed - sow spring in situ. Leaves can be harvested within 8 weeks from sowing. Division in spring. Division is very simple at almost any time of the year, though the plants establish more rapidly in the spring. Use a sharp spade or knife to divide the rootstock, ensuring that there is at least one growth bud on each section of root. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta Industrial Crop: Biomass Management: Hay Management: Standard Minor Global Crop Staple Crop: Balanced carbA very easily grown and tolerant plant, it succeeds in most soils[37], preferring a moist moderately fertile well-drained soil in a sunny position[200]. Shade tolerant[12]. Established plants are tolerant of considerable neglect, surviving even in dense weed growth[K]. Sorrel has been used since ancient times as a food and medicinal plant[244]. It is still occasionally cultivated for its edible leaves, there are some named varieties[183]. The plant stops producing leaves when it flowers in the summer, regrowing after the seed has set. Plants also usually die down in the winter. Cutting down the flowering stem will encourage the growth of fresh young leaves[4]. 'Blonde de Lyon' has large, only slightly acid leaves and is much less likely to flower than the type[200]. This means that the leaves of this cultivar are often available all through the summer and are often also produced throughout the winter, especially if the winter is mild[200, K]. A food plant for the caterpillars of many species of butterfly, it is a good plant to grow in the spring meadow[24]. Dioecious. Male and female plants must be grown if seed is required. The plant is heat tolerant in zones 6 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

4.2.16 *Camassia quamash*

Quamash, Small camas, Utah small camas, Walpole's small camas

3 tlin 7 cyuc 5 kcac 3 tcan 1 dwat 0.3 m hkuc
hmmihtut cyutli tcup hwiels hrasj|lutnykifrip hpa7tli flatprikli-wis hpa7tmwatli xre7t hjonli

drutta *Camassia quamash* is a BULB growing to 0.3 m (1ft) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to June, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: RootEdible Uses: Bulb - raw or cooked[62, 95]. The bulb, which can be up to 5cm in diameter[270], has a mild, starchy flavour when eaten raw,

but a gummy texture that reduces the enjoyment of it somewhat[K]. When cooked, however, it develops a delicious sweet flavour somewhat like sweet chestnuts[92], and is a highly nutritious food[2]. Excellent when slow baked, it can also be dried and made into a powder which can be used as a thickener in stews or mixed with cereal flours when making bread, cakes etc[K]. The bulbs can be boiled down to make a molasses, this was used on festival occasions by various Indian tribes[2, 183]. The bulbs can be harvested at any time of the year[85], but are probably best in early summer when the seeds are ripe[94]. One report says that the bulbs contain inulin (a starch that cannot be digested by humans) but that this breaks down when the bulb is cooked slowly to form the sugar fructose which is sweet and easily digested[256]. Quamash bulbs were a staple food of the N. American Indians[42, 92]. The tribes would move to the Quamash fields in the early autumn and, whilst some people harvested the bulbs, others would dig a pit, line it with boulders then fill it with wood and set fire to it. The fire would heat the boulders and the harvested bulbs would then be placed in the pit and the whole thing covered with earth and the bulbs left to cook slowly for 2 days. The pit would then be opened and the Indians would feast on the bulbs until they could no longer fit any more in their stomachs. Whatever was left would be dried and stored for winter use.

tcanta Notable Products: Nectar, pollen, edible bulb. Attracts Wildlife - flowers attract beneficial insects. Grown as an ornamental plant.

dwatta Birthing aid OxytoxicA decoction of the roots has been used to induce labour[257]. An infusion of the leaves has been used to treat vaginal bleeding after birth and to help expel the placenta[257].

nrakta Western N. America - Washington to California, east to Montana and Utah. ksacta Coastal mountain forests and wet meadows inland[60, 62]. Marshy meadows in coniferous forest, to 2300 metres[90].

propta Seed - best sown as soon as it is ripe in a cold frame[134]. The seed can also be sown in a cold frame in spring[134]. It usually germinates in 1 - 6 months at 15°C, but it can be erratic[138]. Sow the seed thinly so that it does not need to be thinned and allow the seedlings to grow on undisturbed for their first year. Give an occasional liquid feed to ensure that the plants do not become nutrient deficient. When the plants are dormant in late summer, pot up the small bulbs putting 2 - 3 bulbs in each pot. Grow them on for another one or two years in a cold frame before planting them out when dormant in late summer. Offsets in late summer. The bulb has to be scored in order to produce offsets.

nwatta Succeeds in almost any soil[42]. Grows well in heavy clay soils. Prefers a rather heavy loam[1] that has plenty of moisture in spring but does not remain wet over the winter[138, 200]. Dislikes dry soils[200]. Prefers full sun but tolerates partial shade[138, 200]. The dormant bulbs are very hardy and will withstand soil temperatures down to at least -10°C[214]. Quamash is a very pretty flowering bulb that has quite a large potential as an edible ornamental plant[K]. It grows very well in the flower border but can also be naturalised in damp grass[134]. We are intending to grow it in a grassed-down orchard in our Cornish trial ground. The bulbs flower in late spring and early summer and have completely died down by early July so they do not interfere with harvesting the apple crop. The grass in the orchard will be cut in early spring before the quamash comes into growth, but will not be cut again until July. The bulbs will be harvested at any time from July to December and, since it is impossible to find all the bulbs, it is hoped that those remaining will be able to increase and supply bulbs for future years[K]. A polymorphic and very ornamental plant[1], there are some named varieties[200]. The subspecies *C. quamash maxima* has larger bulbs than the type, up to 65mm in diameter[270]. A good bee plant[108]. This species can be confused with certain poisonous bulbs in the genus *Zigadenus*[85]. Plant the bulbs 7 - 10cm deep in early autumn and then leave undisturbed[1]. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat

Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is a bulb.

4.2.17 *Prunus avium*

Wild Cherry, Sweet cherry

3 tlin 7 cyuc 4 kcaak 4 tcan 2 dwat 18 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliwis
hpa7tmwatli dyatxre7t hjonli

drutta *Prunus avium* is a deciduous Tree growing to 18 m (59ft) by 7 m (23ft) at a fast rate. See above for USDA hardness. It is hardy to UK zone 3. It is in flower from April to May, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit Seed Edible Uses: Gum Fruit - raw or cooked[2, 12, 13]. It can be sweet or bitter but it is not acid[11]. The fruit can be cooked in pies etc or used to make preserves. The fruit contains about 78% water, 8.5 - 14% sugars[74]. The fruit is about 20mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity. An edible gum is obtained by wounding the bark[115, 183].

tcanta Dye Gum Tannin Wood Agroforestry Uses: Wild cherry is essentially a pioneer species, and quickly colonises clearings by seeds and suckering, forming secondary woodland, but is often out-competed later by other hardwood species. It is used extensively in Europe for the afforestation of agricultural land and it is also valued for wildlife and amenity plantings[1195]. The flowers are a good source of pollen and nectar for bees[74, 1145]. This species is a bad companion for potatoes, making them more susceptible to potato blight[201], it also suppresses the growth of wheat[18]. It also grows badly with plum trees, its roots giving out an antagonistic secretion[201]. Other Uses: A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. The bark, especially of the root, contains the dye phlorizin[74]. The wood contains the dye xylan[74]. The seed contains around 30% oil[74]. The bark usually only contains small amounts of tannin, but this sometimes rises to 16%[223]. This species has been utilized to breed cherry cultivars with resistance to frost and a number of diseases. Among cultivated forms there are very ornamental ones with double and pink flowers, motley or dissected leaves as well as with a drooping crown[1145]. The heartwood is pinkish-brown; the sapwood red. The grain is fine and straight, with a satiny texture. The wood is firm, compact, and generally free from defects. A valuable, attractive timber that is easy to work, it is used for turnery, furniture, cabinet making, panelling, musical instruments etc[46, 74, 100, 115, 1195]. The red sapwood is valued in turnery and woodwork[74].

dwatta Antitussive Astringent Diuretic Tonic The fruit stalks are astringent, diuretic and tonic[4, 7, 238]. A decoction is used in the treatment of cystitis, oedema, bronchial complaints, looseness of the bowels and anaemia[4, 238]. An aromatic resin can be obtained by making small incisions in

the trunk[7]. This has been used as an inhalant in the treatment of persistent coughs[7]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta Europe, including Britain, from Scandinavia south and east to N. Africa and W. Asia. ksacta Better soils in hedgerows and woods, especially in beech woods[5, 17].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Division of suckers in the dormant season[98]. They can be planted out direct into their permanent positions. Layering in spring.

nwatta Landscape Uses:Espalier. Requires a well-drained moisture retentive soil[1, 11]. Succeeds in light shade but fruits better in a sunny position[11, 200]. Thrives in a loamy soil, doing well on limestone[11]. Prefers some chalk in the soil but apt to become chlorotic if too much is present[1]. A very ornamental plant[1], it is fast growing on deep moist soils[11] but is shallow rooting[98]. Trees cast a light shade and are themselves intolerant of heavy shade[186]. They produce quite a lot of suckers and can form thickets, especially if the main trunk is felled[186]. This species is a parent of many cultivated forms of sweet cherries[17, 34], especially the black fruited forms[11]. Where space is at a premium, or at the limits of their climatic range, sweet cherries can be grown against a wall. Most cultivars will grow well against a sunny south or west facing wall though east or north facing walls are not very suitable[219]. The main problems with growing this species against a wall are firstly that it is usually completely self-sterile and so there needs to be space for at least two different cultivars[186], secondly it is very vigorous and so is difficult to keep within bounds[219]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. An excellent tree for insects[24] and the fruit is a good food source for birds. A bad companion for potatoes, making them more susceptible to potato blight[201], it also suppresses the growth of wheat[18]. It also grows badly with plum trees, its roots giving out an antagonistic secretion[201]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features:Edible, Not North American native, All or parts of this plant are poisonous, Fragrant flowers, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is suckering with new plants from underground runners away from the plant [2-1].

4.2.18 *Prunus serotina*

Rum Cherry - Wild Cherry, Black Cherry, Wild Black Cherry

3 tlin 9 cyuc 4 kcaak 0 tcan 2 dwat 18 m hkuc

rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Requires a well-drained moisture retentive soil[1, 11]. Requires a warm sunny position[11, 159]. Thrives in a loamy soil, doing well on limestone[11]. Prefers some chalk in the soil but apt to become chlorotic if too much is present[1]. A fast-growing and moderately long-lived tree in the wild, producing a heavy fruit crop about once every 4 years[229]. It is cultivated for its timber in C. Europe[50]. This species produces an abundance of flowers and usually fruits well in Britain[11]. In the wild the tree begins to fruit when about 10 years old and then continues for about 100 years, fruiting well in most years[149]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. **Special Features:** Attracts birds, North American native, Naturalizing, All or parts of this plant are poisonous, Attracts butterflies, Fragrant flowers, Attractive flowers or blooms.

pcista The seeds and leaves of this species contain high quantities of hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is readily detected by its bitter taste. Usually present in too small a quantity to do any harm, any very bitter seed or fruit should not be eaten[21, 65]. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death. Discard the seeds. Keep plant way from children [301].

kcakta **Edible Parts:** Fruit **Seed****Edible Uses:** Condiment **Drink****Fruit** - raw or cooked in pies, jellies, stews etc[2, 11, 34, 55, 62, 101, 149, 183]. It must be fully ripe or else it will have a bitter flavour. The fruit can taste sweet or bitter[43]. The better fruits have a thin skin and a juicy flesh with a pleasant vinous flavour[82]. The fruit can also be used as a flavouring[149]. The taste is best when the plant is grown in a sunny position[159]. The fruit is about 9mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity. An infusion of the twigs is used as a beverage[161, 257]. An extract from the bark is used commercially as a flavouring in soft drinks, sweets, syrups and baked goods[183].

tcanta **Dye** **Wood**A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. **Wood** - close and straight-grained, light, strong, rather hard, highly shock resistant[46, 82, 149, 171, 229]. It bends well, works well, finishes smoothly, glues well, seasons well, shrinks moderately and is moderately free from checking and warping[227]. It weighs about 36lb per cubic foot and takes a beautiful polish[227]. It is widely used for furniture, cabinet making, the interior finish of buildings etc[46, 82, 149, 171, 229].

dwatta **Antidiarrhoeal** **Antitussive** **Astringent** **Dysentery** **Pectoral** **Sedative** **Stomachic** **Tonic****Rum** cherry was widely employed medicinally by various native North American Indian tribes who used it to treat a variety of complaints[257]. It is little, if at all, used in modern herbalism. The bark of the root, trunk and branches is antitussive, astringent, pectoral, sedative, stomachic, tonic[4, 21, 95, 165, 238]. The medicinal properties of this plant are destroyed by boiling, so the plant should only be allowed to steep in warm water[213]. The root bark and the aromatic inner bark have expectorant and mild sedative properties and a tea made from either of them has been used to ease pain in the early stages of labour[213, 222]. The tea is also used in the treatment of fevers, colds, sore throats, diarrhoea etc[222, 257]. The bark is harvested in the autumn and should not be stored for longer than one year since it quickly loses its medicinal properties[4, 213]. Young thin bark is preferred[213]. A decoction of the inner bark has been used in the treatment of laryngitis[257]. The root bark has been used as a wash on old sores and ulcers[257]. The bark contains the glycoside prunasin, which is converted in the digestive tract to the highly toxic hydrocyanic acid[222]. Prunasin is at its highest level in the bark in the autumn[222] so the bark is harvested at this time and can be dried for later use[254]. In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238]. The fruit is astringent and has been used in the treatment of dysentery[213].

nrakta **N. America** - Nova Scotia to Minnesota, south to Florida and Texas. Also in Arizona and Mexico. **ksakta** Found in a variety of soils, preferring moist fertile conditions on north or east facing slopes or protected coves[229]. Dry woods[43].

propta **Seed** - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be

rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Requires a well-drained moisture retentive soil[1, 11]. Requires a warm sunny position[11, 159]. Thrives in a loamy soil, doing well on limestone[11]. Prefers some chalk in the soil but apt to become chlorotic if too much is present[1]. A fast-growing and moderately long-lived tree in the wild, producing a heavy fruit crop about once every 4 years[229]. It is cultivated for its timber in C. Europe[50]. This species produces an abundance of flowers and usually fruits well in Britain[11]. In the wild the tree begins to fruit when about 10 years old and then continues for about 100 years, fruiting well in most years[149]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. **Special Features:** Attracts birds, North American native, Naturalizing, All or parts of this plant are poisonous, Attracts butterflies, Fragrant flowers, Attractive flowers or blooms.

4.2.19 *Pyrus ussuriensis*

Harbin Pear, **Chinese pear**, **Ussurian Pear**
3 tin 7 cyuc 4 kcak 2 tcan 0 dwat 15 m hkuc
hmimhtu **cyutli** **hgattcup** **hwicli** **hrasjlutnyikfrip** **hpa7tli** **flatprik****lwis** **hpa7tmwatli** **xre7t** **hjonli**

drutta **Pyrus ussuriensis** is a deciduous Tree growing to 15 m (49ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in April, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. It can tolerate atmospheric pollution.

kcakta **Edible Parts:** Fruit**Edible Uses:** Fruit - raw or cooked[183]. Size and quality varies tremendously from tree to tree. Good forms have somewhat dry but pleasantly flavoured fruits up to 4cm in diameter, other forms are less pleasant and often smaller[K].

tcanta **Rootstock** **Wood**Used as a rootstock[183] for *P. pyrifolia* *culta* in Korea[151], it is very frost resistant[74].

nrakta **E. Asia** - N.E. China, Korea. **ksakta** **Forests** and river valleys in lower mountain zones[74].

propta **Seed** - best sown in a cold frame as soon as it is ripe in the autumn, it will then usually germinate in mid to late winter. Stored seed requires 8 - 10 weeks cold stratification at 1°C and should be sown as early in the year as possible[200]. Temperatures over 15 - 20°C induce a secondary dormancy in the seed[200]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in a cold frame or greenhouse for their first year. Plant them out in late spring or early summer of the following year.

nwatta Prefers a good well-drained loam in full sun[200]. Grows well in heavy clay soils. Tolerates light shade but does not fruit so well in such a position. Tolerates atmospheric pollution, excessive moisture and a range of soil types if they are moderately fertile[200]. Established plants are drought tolerant[200]. A very frost resistant tree[74], tolerating temperatures down to below -15°C[200], it is a possible rootstock for northern areas[74]. It is used as a rootstock for *P. pyrifolia* *culta* in Korea. This species is a parent of the cultivated Asian pears[200]. **Special Features:**Not North American native, Blooms are very showy.

4.2.20 *Pinus cembra*

Swiss Stone Pine, **Swiss Pine**, **Arolla Pine**
3 tin 9 cyuc 4 kcak 3 tcan 2 dwat 15 m hkuc

hmmihtut cyutli hqatkyuctup hwicli hrasjlutnyik krfp hpa7tli flatprik hpa7tmwatli dyat hjonli

drutta Pinus cembra is an evergreen Tree growing to 15 m (49ft) by 6 m (19ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in leaf all year, in flower from May to June, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is self-pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].
kckaia Edible Parts: Oil Seed Edible Uses: Condiment Oil Seed - raw or cooked[1, 2, 4, 34, 177, 183]. Much valued as a food, the oil-rich seed has a delicious flavour but with a slight flavour of turpentine. A reasonable size, it is about 10mm x 8 mm[200]. An edible drying oil is obtained from the seed[2, 57, 63, 183]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulp-wood[200].

tcanta Dye Herbicide Oil Resin Wood Landscape Uses: Screen, Specimen, ornamental. A tan or green dye is obtained from the needles[168]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. Turpentine is obtained from the leaves[46, 61]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. Wood - soft, easily worked. Used for furniture, turnery etc[46, 61, 100].

dwatta The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge[4]. It is a valuable remedy used internally in the treatment of kidney and bladder complaints and is used both internally and as a rub and steam bath in the treatment of rheumatic affections[4]. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and TB[4]. Externally it is a very beneficial treatment for a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers[4].

nrakta Europe - Alps, running north to Russia and Siberia. ksacta Rarely found below elevations of 1500 metres, it grows with larch up to the tree line[11, 81].

propta It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed[80]. Plant seedlings out into their permanent positions as soon as possible and protect them for their first winter or two[11]. Plants have a very sparse root system and the sooner they are planted into their permanent positions the better they will grow[K]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm[200]. We actually plant them out when they are about 5 - 10cm tall. So long as they are given a very good weed-excluding mulch they establish very well[K]. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Cuttings. This method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

nwatta Thrives in a light well-drained sandy or gravelly loam[1]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. Succeeds in most situations, flourishing on N. facing slopes and in moist heavy clay soils[81]. Grows best in the cooler wetter areas of Britain[11, 81]. A very hardy plant tolerating temperatures down to about -30°C[160]. The edible seeds are collected in large numbers in Siberia and are often exported[142]. (This report probably refers to the sub-species *P. cembra sibirica*.) This species does not appear to be long lived or to produce its cones freely in S. Britain[11]. It does not produce cones until it is 30 years old[200]. The cones take three years to ripen and then fall from the tree with the seeds still inside[120]. The seed is often eaten by squirrels etc before it can fall to the ground. The cones do not open, seed is extracted by breaking up the soft scales of the cone[200]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. Slow growing in cultivation[81, 120], plants usually make less than 30 cm increase in height per year even when young[185]. Leaf secretions inhibit the germination of seeds, thereby inhibiting the growth of other plants below the tree[18]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Not North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. An evergreen.

4.2.21 Actinidia kolomikta

Kiwi

3 tlin 8 cyuc 4 kcak 0 tcan 0 dwat 10 m hkcuc
hmmihtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik lwis hpa7tmwatli nyanhjen hjonli

drutta Actinidia kolomikta is a deciduous Climber growing to 10 m (32ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in June, and the seeds ripen from October to November. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is self-pollinated by Bees, insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kckaia Edible Parts: Fruit Leaves Edible Uses: Fruit - raw, cooked or dried for later use[1, 3, 105, 183]. Sweet and agreeable[1, 74]. It contains up to 5 times the vitamin C of blackcurrants[74]. The ovoid fruit is hairless and pale orange when fully ripe and is up to 25mm in diameter[266]. It contains a number of small seeds, but these are easily eaten with the fruit[K]. Young leaves - cooked[105, 177]. Used as a potherb or added to soups[183]. One report suggests the its Content of vitamin C in berries is 1520mg in 100grams of fruit.

nrakta E. Asia - China, Japan, E. Siberia. ksacta Coniferous woodlands and hedges in mountains throughout Japan[58, 126]. Mountain mixed forests in open places at elevations of 1600 - 2900 metres in China[266].

propta Seed - sow spring in a greenhouse[133]. It is probably best if the seed is given 3 months stratification[113], either sow it in a cold frame as soon as it is ripe in November or as soon as it is received. Fresh seed germinates in 2 - 3 months at 10°C, stored seed can take longer[133]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. When the

plants are 30cm or more tall, plant them out into their permanent positions in late spring or early summer, after the last expected frosts[K]. Most seedlings are male[126]. The seedlings are subject to damping off, they must be kept well ventilated[113]. Cuttings of softwood as soon as ready in spring in a frame[K]. Cuttings of half-ripe wood, July/August in a frame. Very high percentage[113]. Cuttings of ripe wood, October/November in a frame.

kwatta Landscape Uses:Arbor. Prefers a sound loamy neutral soil[11, 200]. Succeeds in semi-shade but full sun is best for fruit production[200]. Another report says that the plant prefers semi-shade[160]. Prefers a sheltered position[200]. When grown in a sunny position the leaves normally develop a strong variegation[219]. Prefers a neutral soil, plants become more variegated when they are grown in a limy soil[200]. Very cold resistant, dormant plants are hardy to at least -30°C but new growth in spring can be cut back by late frosts[74, 160, 200]. Plants grow well on a wall and can also be grown into trees[1]. Cats are very fond of this plant and can damage it by scratching it etc[1, 3, 200]. A very ornamental plant[1], there are some named varieties that have been selected for their edible fruit[183, 200]. The form most often cultivated in this country is a male and it is quite possible that all the plants grown here have been developed from a single clone[219]. Often confused with the closely related *A. polygama*, but it can be distinguished by its leaves which are heart-shaped at the base whilst those of *A. polygama* are tapered[219]. Fruits are produced on second year wood or on fruit spurs on older wood[126], any pruning is best carried out in the winter[219]. The flowers are sweetly scented[184]. This is a climbing plant, supporting itself by twining around branches etc[200]. Plants in this genus are notably resistant to honey fungus[200]. Dioecious. Male and female plants must be grown if seed is required. **Special Features:**Not North American native, Fragrant flowers, Attractive flowers or blooms. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. **Woody.** Growth habit is a single or multiple shooting vine from a crown [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.2.22 *Malus prunifolia*

Chinese Apple, Plumleaf crab apple
3 tlin 7 cyuc 4 kcaak 0 tcan 0 dwat 8 m hkc
hmmihmt cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flat-
prkrlwis hpa7tmwatli xre7t hjonli

drutta *Malus prunifolia* is a deciduous Tree growing to 8 m (26ft) by 8 m (26ft). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from April to May, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. **Suitable for:** light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. **Suitable pH:** mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought.

pcista All members of this genus contain the toxin hydrogen cyanide in their seeds and possibly also in their leaves, but not in their fruits. Hydrogen cyanide is the substance that gives almonds their characteristic taste but it should only be consumed in very small quantities. Apple seeds do not normally contain very high quantities of hydrogen cyanide but, even so, should not be consumed in very large

quantities. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit **Edible Uses:** Fruit - raw or cooked[183]. A bitter flavour[K]. Fruits we have tasted have been astringent rather than bitter, though some cultivars and forms are not at all bitter. A fruit of the species, tasted at Kew in October 1991, had a sweet pleasant taste, was mealy and of low acidity[K]. The fruit can be used fresh or in preserves etc. The fruit is about 20mm in diameter[200], though some forms are considerably larger[K].

tcanta RootstockThis species is an excellent stock for grafting apple trees[266].

nrakta E. Asia - northern China. **ksacta Slopes and plains** from sea level to 1300 metres[266].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. It usually germinates in late winter. Stored seed requires stratification for 3 months at 1°C and should be sown in a cold frame as soon as it is received[200]. It might not germinate for 12 months or more. Prick out the seedlings into individual pots as soon as they are large enough to handle. If given a rich compost they usually grow away quickly and can be large enough to plant out in late summer, though consider giving them some protection from the cold in their first winter. Otherwise, keep them in pots in a cold frame and plant them out in late spring of the following year. Cuttings of mature wood, November in a frame[11].

kwatta An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[200]. Highly resistant to frost and drought, this species is being used to a limited extent in breeding programmes for cultivated apples[183]. The cultivar 'Hyslop' has edible fruits 4cm in diameter[200]. Hybridizes freely with other members of this genus[200]. The fruit is a good wildlife food source, especially for birds[200]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.23 *Malus pumila*

Paradise Apple, Common Apple, Apple Tree
3 tlin 9 cyuc 4 kcaak 3 tcan 2 dwat 7 m hkc
hmmihmt cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flat-
prkrlwis hpa7tmwatli xre7t hjonli

drutta *Malus pumila* is a deciduous Tree growing to 7 m (23ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in April. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. **Suitable for:** light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. **Suitable pH:** mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista All members of this genus contain the toxin hydrogen cyanide in their seeds and possibly also in their leaves, but not in their fruits. Hydrogen cyanide is the substance that gives almonds their characteristic taste but it should only be consumed in very small quantities. Apple seeds do not normally contain very high quantities of hydrogen cyanide but, even so, should not be consumed in very large quantities. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit **Edible Uses:** Fruit - raw, cooked in pies, cakes etc or fermented into cider[183]. The taste can be sweet and pleasant. The fruit can be up to 6cm in diameter[200].

tcanta Dye Rootstock WoodUsed as a rootstock for the cultivated apples, there are several named varieties[50]. A yellow dye is obtained from the bark[257]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch. **Landscape Uses:** Container, Espalier, Specimen.

dwatta Anthelmintic Antibacterial Bach Hypnotic Refrigerant The bark, and especially the root bark, is anthelmintic, refrigerant and soporific[218, 240]. An infusion is used in the treatment of intermittent, remittent and bilious fevers[240]. The fruit is said to dispel gas, dissolve mucous, cure flux and be a tonic for anaemia, bilious disorders and colic[218]. The leaves contain up to 2.4% of an antibacterial substance called 'phloretin'[240]. This inhibits the growth of a number of gram-positive and gram-negative bacteria in as low a concentration as 30 ppm[240]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'The cleansing remedy', 'Despondency' and 'Despair'[209].

nrakta Europe, including Britain, from Scandinavia south and east to Spain, Greece and S.W. Asia. ksacta Not known in a truly wild situation[74].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. It usually germinates in late winter. Stored seed requires stratification for 3 months at 1°C and should be sown in a cold frame as soon as it is received[200]. It might not germinate for 12 months or more. Prick out the seedlings into individual pots as soon as they are large enough to handle. If given a rich compost they usually grow away quickly and can be large enough to plant out in late summer, though consider giving them some protection from the cold in their first winter. Otherwise, keep them in pots in a cold frame and plant them out in late spring of the following year. Cuttings of mature wood, November in a frame[11].

nwatta An overstory and understory tree (can grow and fruit in some shade). An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. A parent of the cultivated apple[200], it is occasionally cultivated for its edible fruit and also as a dwarfing rootstock[50]. There are some named forms[200]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Attracts birds, Not North American native, Attractive flowers or blooms. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2].

4.2.24 *Sambucus nigra* spp *canadensis*

American Elder

3 tlin 9 cyuc 4 kcak 3 tcan 3 dwat 4 m hkuc
hmmihmtut cyutli tcup hwicli hrasj|utnyikfrip hpa7tli flatprikli-wis hpa7tmwatli xre7t hjonli

drutta *Sambucus nigra* spp *canadensis* is a deciduous shrub growing to 4 m (13ft) by 4 m (13ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in July, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

pcista The leaves and stems of this species are poisonous[9, 76]. The fruit has been known to cause stomach upsets to some people[65, 76]. The unripe fruit contains a toxic alkaloid and cyanogenic glycosides[274]. Any toxin the fruit might contain is liable to be of very low toxicity and is destroyed when the fruit is cooked[65, 76].

kcakta Edible Parts: Flowers Fruit Shoots Edible Uses: Drink Tea Fruit - raw or cooked[2, 3, 55, 85, 257]. A bittersweet flavour, the fruits are about 5mm in diameter and are borne in large clusters[200, 227]. They are at their best after being dried[62], the fresh raw fruit has a rather rank taste[101]. The fruit is normally cooked and used in pies, jams, jellies, sauces, bread etc[62, 159, 183]. Rich in vita-

min C[183]. Some caution is advised, see notes above on toxicity. Flowers - raw or cooked. They are often covered in batter and made into fritters[105]. The flowers can be picked when unopened, pickled and then used as a flavouring in candies etc[149, 227]. They can also be soaked in water to make a drink[149]. A pleasant tasting tea is made from the dried flowers[21, 159, 183, 257]. Young shoots are said to be edible when cooked and to be used as an asparagus substitute[55, 105] though, since the leaves are also said to be poisonous, this report should be viewed with some doubt.

tcanta Compost Dye Hedge Insecticide Musical Pipes Plant breeding Repellent Agroforestry Uses: When grown near a compost heap, the root activity of this plant encourages fermentation in the compost heap[18]. Other Uses: The leaves and inner bark of young shoots are used as an insect repellent[6, 101, 149, 159, 257], the dried flowering shoots are said to repel insects and rodents[101]. A decoction of the leaves can be used as an insecticide[201]. It is prepared by boiling 3 - 4 handfuls of leaves in a litre of water, then straining and allowing to cool before applying. Effective against many insects, it also treats various fungal infections such as leaf rot and powdery mildew[201]. A black dye is obtained from the bark[149]. When grown near a compost heap, the root activity of this plant encourages fermentation in the compost heap[18]. The stems can be easily hollowed out to be used as drains in tapping the sap from trees such as the Sugar Maples (*Acer* spp). The stems can also be used as whistles and flutes[149, 159].

dwatta Antidiarrhoeal Antiseptic Cholera Diaphoretic Diuretic Emetic Febrifuge Kidney Laxative Poultrice Purgative Skin Stimulant Vitamine C American elder was widely employed as a medicinal herb by many native North American tribes who used it to treat a wide range of complaints[257]. It is still commonly used as a domestic remedy. A tea made from the inner bark and root bark is diuretic, emetic and a strong laxative[222, 257]. A tea made from the root bark is used to promote labour in childbirth and in treating headaches, kidney problems and mucous congestion[21, 257]. The inner bark is also applied as a poultice to cuts, sore or swollen limbs etc in order to relieve pain and swelling[222, 257]. A poultice of the leaves is applied to bruises and to cuts in order to stop the bleeding[222]. An infusion of the leaf buds is strongly purgative[21]. Elder flowers are stimulant, diaphoretic and diuretic[213, 257]. A warm tea of the flowers is stimulant and induces sweating, taken cold it is diuretic[21]. It is used in the treatment of fevers and infant colic[257]. An infusion of the leaves and flowers is used as an antiseptic wash for skin problems, wounds etc[21]. The fresh juice of the fruit, evaporated into a syrup, is laxative. It also makes a good ointment for treating burns when mixed with an oily base[21]. The dried fruit can be made into a tea that is useful in the treatment of cholera and diarrhoea[21]. Some caution should be exercised if using any part of the plant fresh since it can cause poisoning[21].

nrakta Eastern N. America - Nova Scotia to Florida, west to Manitoba and Texas. ksacta Rich moist soils along streams and rivers, woodland margins and waste ground[229].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame, when it should germinate in early spring. Stored seed can be sown in the spring in a cold frame but will probably germinate better if it is given 2 months warm followed by 2 months cold stratification first[78, 98, 113]. Prick out the seedlings into individual pots when they are large enough to handle. If good growth is made, the young plants can be placed in their permanent positions during the early summer. Otherwise, either put them in a sheltered nursery bed, or keep them in their pots in a sheltered position and plant them out in spring of the following year. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame[78]. Cuttings of mature wood of the current season's growth, 15 - 20cm with a heel, late autumn in a frame or a sheltered outdoor bed[78]. Division of suckers in the dormant season.

nwatta Agroforestry Services: Contour hedgerow Indus Crop: Dye Industrial Crop: Medicinal Management: Standard Regional Crop Tolerates most soils, including chalk[200], but prefers a moist loamy soil[11, 200]. Grows well in heavy clay soils. Tolerates some shade but is best in a sunny position[1]. Tolerates atmospheric pollution and coastal situations[200]. A very hardy plant, when dormant it tolerates temperatures down to about -34°C[200]. The flowers have a muscatel smell[245]. A fast-growing but

short-lived plant[229], it often forms thickets by means of root suckers[200]. It is occasionally cultivated for its edible fruit, there are several named varieties[183], though these have mainly been developed for their ornamental value[182]. Yields of up to 7kg of fruit per tree have been recorded[160]. Plants in this genus are notably resistant to honey fungus[200]. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.25 *Rhus glabra*

Smooth Sumach

3 tlin 9 cyuc 4 kcaak 3 tcan 3 dwat 3 m hkuc

htut cyutli kyuctcup hwicli hyshrasjlutnyik hpa7tli flatprikli-wis hpa7tmwatli nyanhjen hjonli

drueta *Rhus glabra* is a deciduous Shrub growing to 3 m (9ft) by 3 m (9ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower from July to August, and the seeds ripen from September to November. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Bees. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista There are some suggestions that the sap of this species can cause a skin rash in susceptible people, but this has not been substantiated. See also notes in 'Cultivation Details'.

kcakta Edible Parts: Fruit Oil Root Stem Edible Uses: Drink Oil Fruit - raw or cooked[2, 22, 46]. An acid flavour, it has been used as a substitute for lemon juice[2]. The fruit is rather small and with very little flesh, but it is produced on fairly large panicles and so is easily harvested. When soaked for 10 - 30 minutes in hot or cold water it makes a very refreshing lemonade-like drink (without any fizz of course)[85, 95, 101, 102, 149, 159, 183]. The mixture should not be boiled since this will release tannic acids and make the drink astringent. Root - peeled and eaten raw[161, 183]. This report should be treated with some caution due to possible toxicity[214]. Young shoots - peeled and eaten raw[183, 257]. This report should be treated with some caution due to possible toxicity[214]. The bark has been eaten as a delicacy by children[257]. This report should be treated with some caution due to possible toxicity[214].

tcanta Dye Hedge Hedge Mordant Oil Pioneer Shelterbelt Soil stabilization Tannin Wood The leaves are rich in tannin, containing about 10 - 25%[171]. Up to 31.2% has been obtained from some plants[223]. They can be collected as they fall in the autumn and used as a brown dye or as a mordant[169]. The twigs and root are also rich in tannin[149]. A black and a red dye is obtained from the fruit[4, 257]. A black dye is obtained from the leaves, bark and roots[257]. An orange or yellow dye is obtained from the roots harvested in spring[46, 61, 257]. A light yellow dye is obtained from the pulp of the stems[257]. The inner bark, mixed with bloodroot (*Sanguinaria canadensis*) and the inner bark of wild plum (*Prunus* sp.) has been used to make a yellow dye[257]. An oil is extracted from the seeds[4]. It attains a tallow-like con-

sistency on standing and is used to make candles. These burn brilliantly, though they emit a pungent smoke[4]. The plant has an extensive root system and is fairly wind tolerant, though branches can be broken off in very strong winds. It is planted for soil stabilization and as a shelter screen[200]. It can quickly establish itself in open sunny locations and so can be used as a pioneer species for establishing woodlands[229]. Wood - soft, light, brittle[101, 149].

dwatta Alterative Antiseptic Appetizer Astringent Diuretic Dysentery Emetic Emmenagogue Febrifuge Galactagogue Haemostatic Ophthalmic Refrigerant Rubefacient Salve TB Tonic Smoothumach was employed medicinally by various native North American Indian tribes who used it to treat a variety of complaints[257]. It is occasionally used in modern herbalism where it is valued for its astringent and antiseptic qualities. Some caution should be employed in the use of this species since it can possibly cause skin irritations. It is best only used under the supervision of a qualified practitioner. A tea made from the bark or root bark is alterative, antiseptic, astringent, galactagogue, haemostatic, rubefacient and tonic[4, 222, 238, 257]. It is used in the treatment of diarrhoea, fevers, general debility, sore mouths, rectal bleeding, uterine prolapse etc[222, 254]. It is used as a gargle to treat sore throats and applied externally to treat excessive vaginal discharge, burns and skin eruptions[254, 257]. The powdered bark can be applied as a poultice to old ulcers, it is a good antiseptic[4]. A tea made from the roots is appetizer, astringent, diuretic and emetic[222, 257]. An infusion is used in the treatment of colds, sore throats, painful urination, retention of urine and dysentery[257]. The root is harvested in the autumn and dried for later use[254]. An infusion of the green or dried branches has been used in the treatment of TB[257]. A decoction of the branches, with the seed heads, has been used to treat itchy scalps and as a bathing water for frost-bitten limbs[257]. The milky latex from the plant has been used as a salve on sores[257]. A tea made from the leaves was used in the treatment of asthma, diarrhoea and stomatitis[222]. A poultice of the leaves has been used to treat skin rashes[257]. The leaves have been chewed to treat sore gums and they have been rubbed on the lips to treat sore lips[257]. The berries are diuretic, emetic, emmenagogue, purgative and refrigerant[4, 257]. They are used in the treatment of late-onset diabetes, stranguary bowel complaints, febrile diseases, dysmenorrhoea etc[4, 254, 257]. They have been chewed as a remedy for bed-wetting[222, 257]. The blossoms have been chewed as a treatment for sore mouths[257]. A decoction of the blossoms has been used as a mouthwash for teething children[257]. An infusion of the blossoms has been used as an eye wash for sore eyes[257].

nrakta N. America - found in all 48 mainland states of USA[214] and in southern Canada. ksacta Thickets and waste ground on dry soil and by streams[4, 43, 60]. The best specimens are found in rich moist soil[149, 229].

propta Seed - best sown in a cold frame as soon as it is ripe. Pre-soak the seed for 24 hours in hot water (starting at a temperature of 80 - 90c and allowing it to cool) prior to sowing in order to leach out any germination inhibitors[200]. This soak water can be drunk and has a delicious lemon-flavour. The stored seed also needs hot water treatment and can be sown in early spring in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 10cm with a heel, July/August in a frame[200]. Root cuttings 4cm long taken in December and potted up vertically in a greenhouse. Good percentage[78, 200]. Suckers in late autumn to winter[200].

nwatta Landscape Uses:Border, Specimen. Succeeds in a well-drained fertile soil in full sun[11, 200]. Tolerates poor sandy soils[200]. A very hardy plant, when fully dormant it can tolerate temperatures down to at least -25°C[200]. However, the young growth in spring can be damaged by late frosts. A fast-growing but short-lived plant in the wild[229]. Single-stem plants are short-lived in cultivation, but if the plants are coppiced regularly and allowed to form thickets, then they will live longer and also be more ornamental with larger leaves[238]. Any coppicing is best carried out in early spring[238]. It is a very ornamental plant, there are some named varieties[182]. Closely allied to *R. typhina*[11], it hybridizes with that species where their ranges overlap[101,

229]. Plants have brittle branches and these can be broken off in strong winds[200]. Plants are also susceptible to coral spot fungus[11]. Plants in this genus are notably resistant to honey fungus[200]. A good bee plant[K]. Many of the species in this genus are highly toxic and can also cause severe irritation to the skin of some people, whilst other species such as this one are not poisonous. It is relatively simple to distinguish which is which, the poisonous species have axillary panicles and smooth fruits whilst non-poisonous species have compound terminal panicles and fruits covered with acid crimson hairs[1, 4]. The toxic species are sometimes separated into their own genus, Toxicodendron, by some botanists[200]. Dioecious. Male and female plants must be grown if seed is required. Special Features: Attracts birds, North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.26 *Rubus occidentalis*

Black Raspberry
 3 tlin 7 cyuc 4 kcaak 1 tcan 2 dwat 3 m hkuc
 hmimhtut cyuti tcup hwicli hrsjlutnyik hpa7tli flatprikhlwis
 hpa7tmwatli xre7t hjonli

drutta *Rubus occidentalis* is a deciduous Shrub growing to 3 m (9ft 10in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Stem Edible Uses: Tea Fruit - raw or cooked and used in pies, preserves etc[2, 3, 34, 62, 85, 101, 183]. It is of variable quality, with the finest forms having a rich acid flavour[2]. The hemispherical fruit is about 15mm in diameter[200]. Young shoots - raw or cooked like rhubarb[101, 161, 183, 257]. They are harvested as they emerge through the soil in the spring, and whilst they are still tender, and then peeled[K]. A tea is made from the leaves and another from the bark of the root[161, 183], 257.

tcanta Dye A purple to dull blue dye is obtained from the fruit[168].

dwatta Astringent Cathartic Dysentery Ophthalmic Pectoral Salve TB VD The roots are cathartic[257]. A decoction of the roots has been used in the treatment of gonorrhoea[257]. The root has been chewed in the treatment of coughs and toothache[257]. An infusion of the roots has been used as a wash for sore eyes[257]. The root has been used, combined with *Hypericum* spp, to treat the first stages of consumption[257]. An infusion of the astringent root bark is used in the treatment of diarrhoea and dysentery[213, 222]. The leaves are highly astringent[257]. A decoction is used in the treatment of bowel complaints[257]. A tea made from the leaves is used as a wash for old and foul sores, ulcers and boils[222, 257]. A decoction of the roots, stems and leaves has been used in the treatment of whooping cough[257].

nrakta Eastern and Central N. America - New Brunswick to Ontario, south to Georgia and Missouri. ksacta Rich thickets, ravines and borders of woods[43], often in full shade[62] and preferring moist positions[159].

propta Seed - requires stratification and is best sown in early autumn in a cold frame. Stored seed requires one

month stratification at about 3°C and is best sown as early as possible in the year. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Cuttings of half-ripe wood, July/August in a frame[200]. Tip layering in July. Plant out in autumn. Division in early spring or just before leaf-fall in the autumn[200].

nwatta Easily grown in a good well-drained loamy soil in sun or semi-shade[1, 11, 200]. Sometimes cultivated, especially in N. America, for its edible fruit[183], it is a parent of many named varieties[1, 34]. This species is a raspberry with biennial stems, it produces a number of new stems each year from the perennial rootstock, these stems fruit in their second year and then die[200]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.27 *Lonicera caerulea*

Sweetberry honeysuckle, Bluefly honeysuckle, Haskap berry
 3 tlin 9 cyuc 4 kcaak 0 tcan 0 dwat 2 m hkuc
 htut cyuti tcup hwicli hrsjlutnyik hpa7tli flatprikhlwis
 hpa7tmwatli dyatxre7t hjonli

drutta *Lonicera caerulea* is a deciduous Shrub growing to 2 m (6ft 7in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Fruit Edible Uses: The following report is for the closely related *L. villosa*, it would be worthwhile experimenting with this plant to check on edibility[K]. The fruit of this species is about 5mm in diameter[235]. Fruit - raw or preserved[43, 105, 200]. A milder flavour than most edible honeysuckles, they can be eaten raw but are mainly used in making jams, jellies and refreshing drinks[183].

nrakta N.E. Europe. Northern N. America - Newfoundland to Alaska and southwards. ksacta Low ground[235].

propta Seed - best sown as soon as it is ripe in a cold frame. Stored seed requires 2 months cold stratification[113] and should be sown as soon as possible in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 7-10cm with or without a heel, July/August in a frame. Good percentage[78]. Cuttings of mature wood of the current season's growth, 15-20cm with or without a heel, November in a cold frame. Good percentage[78]. Layering in autumn[200].

nwatta Grows best in a good moist soil in a sunny position, it does not fruit so well in the shade[200]. Closely related to *L. villosa*[200]. Interesting botanically because it appears as though two flowers arise from a single ovary[11]. The fruit is actually a fleshy growth that surrounds the two ovaries[11]. A very variable species[11], there are some named forms selected for their ornamental value[200]. Plants of many haskap cultivars grow to be 1.5 to 2 meters tall and wide, can survive a large range of soil acidity, from 3.9-7.7 (optimum 5.5-6.5), requiring high organic matter, well drained soils, and plentiful sunlight for optimum productivity. *Lonicera caerulea* plants are more tolerant of wet conditions than most fruit species. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.2.28 *Amaranthus cruentus*

Purple Amaranth, Red amaranth
3 tlin 11 cyuc 4 kcaak 2 tcan 2 dwat 2 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikwlis
hpa7tmwatli fyif hjonli

drutta *Amaranthus cruentus* is a ANNUAL growing to 2 m (6ft 7in). See above for USDA hardiness. It is hardy to UK zone 4 and is frost tender. It is in flower from July to September, and the seeds ripen from August to September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It cannot grow in the shade. It prefers moist soil.

pcista No members of this genus are known to be poisonous, but when grown on nitrogen-rich soils they are known to concentrate nitrates in the leaves. This is especially noticeable on land where chemical fertilizers are used. Nitrates are implicated in stomach cancers, blue babies and some other health problems. It is inadvisable, therefore, to eat this plant if it is grown inorganically.

ckakta Edible Parts: Leaves Seed Edible Uses: ColouringLeaves - cooked as a spinach[183]. The mild-flavoured leaves are rich in vitamins and minerals[183]. Seed - very small but easy to harvest and very nutritious. They are eaten cooked or ground into a powder and used for making cakes etc[183, 257]. They can also be sprouted and used in salads[183]. The seed can be cooked whole, and becomes very gelatinous like this, but it is rather difficult to crush all of the small seeds in the mouth and thus some of the seed will pass right through the digestive system without being assimilated[K]. The flowers are used as a food colouring in ceremonial maize bread[183].

tcanta DyeYellow and green dyes can be obtained from the whole plant[168].

dwatta The plant can be cultivated from the tropics to the temperate zone. It grows best in areas where annual daytime temperatures are within the range 22 - 28°C, but can tolerate 10 - 45°C[418]. It can be killed by temperatures of 4°C or lower[418]. It prefers a mean annual rainfall in the range 2,000 - 2,400mm, but tolerates 500 - 4,000mm[418]. Prefers a well-drained fertile soil in a sunny position[200]. Requires a hot sheltered position if it is to do well[K]. Prefers a pH in the range 5.5 - 7, tolerating 4.3 - 7.5[418]. Often cultivated as a food crop and ornamental plant, it has escaped from cultivation in many areas and become naturalised as a weed of cultivated and disturbed ground[305]. A fast-growing plant, the first crop of leaves can be harvested in 30 - 50 days from sowing the seed, and the plant can carry on being harvested for up to another 250 days[418]. Grain yields usually range from 800-1200 kg/ha but with the use of fertilizers the yield can be raised up to 3 t/ha. This species is cultivated for its edible seed in many parts of S. America and in Japan[58 , 97 , 183]. There is at least one named variety, 'Oeschberg' is a very productive plant, growing 1 metre tall and can yield up to 2.5 tonnes per hectare[183]. This species is the most adaptable of the grain amaranths, it also flowers under a wider range of daylength hours than the other species[183]. Plants are particularly susceptible to attacks by leaf-chewing insects[298]. Plants should not be given inorganic fertilizers, see notes above on toxicity. Most if not all members of this genus photosynthesize by a more efficient method than most plants. Called the 'C4 carbon-fixation pathway', this process is particularly efficient at high temperatures, in bright sunlight and under dry conditions[196].

nrakta Original habitat is obscure, it was probably tropical America. *ksacta* Not known in a truly wild situation.

propta Seed - sow late spring in situ. An earlier sowing can be made in a greenhouse and the plants put out after the last expected frosts. Germination is usually rapid and good if the soil is warm[133]. A drop in temperature overnight aids germination[133]. Cuttings of growing plants root easily[206].

nwatta Prefers a well-drained fertile soil in a sunny position[200]. Requires a hot sheltered position if it is to do well[K]. Tolerates a pH in the range 4 to 7.5. Plants should not be given inorganic fertilizers, see notes above on toxicity. This species is cultivated for its edible seed in many parts of S. America and in Japan[58, 97, 183]. There is at

least one named variety, 'Oeschberg' is a very productive plant, growing 1 metre tall and can yield up to 2.5 tonnes per hectare[183]. This species is the most adaptable of the grain amaranths, it also flowers under a wider range of daylength hours than the other species[183]. Most if not all members of this genus photosynthesize by a more efficient method than most plants. Called the 'C4 carbon-fixation pathway', this process is particularly efficient at high temperatures, in bright sunlight and under dry conditions[196]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is clumping, giving the plant a clumping habit. The predictable growth behaviour makes it easier to maintain without having to apply containment methods[2-1].

4.2.29 *Arctium lappa*

Great Burdock, Gobo
3 tlin 7 cyuc 4 kcaak 2 tcan 5 dwat 2 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli fyifxre7t hjonli

drutta *Arctium lappa* is a BIENNIAL growing to 2 m (6ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to September, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Care should be taken if harvesting the seed in any quantity since tiny hairs from the seeds can be inhaled and these are toxic[205]. Can cause allergic reactions. Contra-indicated during pregnancy [301].

ckakta Edible Parts: Leaves Root Seed Stem Edible Uses: Root - raw or cooked[2, 7, 9, 14, 179]. Very young roots can be eaten raw, but older roots are normally cooked[206]. They can be up to 120cm long and 2.5cm wide at the top, but are best harvested when no more than 60cm long[206]. Old and very long roots are apt to become woody at the core[206]. Although it does not have much flavour the root can absorb other flavours[116]. Young roots have a mild flavour, but this becomes stronger as the root gets older[206]. The root is white but discolours rapidly when exposed to the air[206]. Roots can be dried for later use[213]. They contain about 2.5% protein, 0.14% fat, 14.5% carbohydrate, 1.17% ash[179]. The root contains about 45% inulin[240]. Inulin is a starch that cannot be digested by the human body, and thus passes straight through the digestive system. In some people this starch will cause fermentation in the gut, resulting in wind[K]. Inulin can be converted into a sweetener that is suitable for diabetics to eat[K]. Young leaves - raw or cooked[9, 12, 14, 62]. A mucilaginous texture[179]. The leaves contain about 3.5% protein, 1.8% fat, 19.4% carbohydrate, 8.8% ash[179]. Young stalks and branches - raw or cooked[2, 9, 52, 55, 62]. Used like asparagus or spinach[12, 183]. They taste best if the rind is removed[85, 117]. The leaf stalks can be parboiled and used as a substitute for cardoons[183]. The pith of the flowering stem can be eaten raw in salads, boiled or made into confections[4, 183]. A delicate vegetable, somewhat like asparagus in flavour[4]. The seeds can be sprouted and used like bean-sprouts[12, 52, 183].

tcanta HairThe juice of the plant, when used as a friction, is said to have a stimulating action against baldness[7].

dwatta Alternative Antibacterial Antifungal Antiphlogistic Antisporiatic Aperient Blood purifier Carminative Cholagogue Depurative Diaphoretic Diuretic Eczema Hypoglycaemic StomachicBurdock is one of the foremost detoxifying herbs in both Chinese and Western herbal medicine[254]. The dried root of one year old plants is the official herb, but the leaves and fruits can also be used[4]. It is used to treat conditions caused by an 'overload' of toxins, such as throat and other infections, boils, rashes and other skin problems[254]. The root is thought to be particularly good at helping to eliminate heavy metals from the body[254]. The

is also part of a North American formula called E-siac which is a popular treatment for cancer. Its effectiveness has never been reliably proven or disproven since controlled studies have not been carried out. The other herbs included in the formula are *Rumex acetosella*, *Ulmus rubra* and *Rheum palmatum*[254]. The plant is antibacterial, antifungal, carminative[9, 21, 147, 165, 176]. It has soothing, mucilaginous properties and is said to be one of the most certain cures for many types of skin diseases, burns, bruises etc[4, 244]. It is used in the treatment of herpes, eczema, acne, impetigo, ringworm, boils, bites etc[244]. The plant can be taken internally as an infusion, or used externally as a wash[244]. Use with caution[165]. The roots of one-year old plants are harvested in mid-summer and dried. They are alterative, aperient, blood purifier, cholagogue, depurative, diaphoretic, diuretic and stomachic[218, 222]. The seed is alterative, antiphlogistic, depurative, diaphoretic and diuretic[218]. Recent research has shown that seed extracts lower blood sugar levels[238]. The seed is harvested in the summer and dried for later use[254]. The crushed seed is poulticed onto bruises[222]. The leaves are poulticed onto burns, ulcers and sores[222].

nrakta Most of Europe, including Britain, east to northern Asia. **ksakta** Waste ground, preferring calcareous soils[7], it is sometimes also found in meadows and woods[9].

propta Seed - best sown in situ in the autumn[200]. The seed can also be sown in spring[206]. Germination can be erratic, it is best to sow the seed in trays and plant out the young plants before the tap-root develops[206]. Seed requires a minimum temperature of 10°C, but a temperature of 20 - 25°C is optimum[206]. Germination rates can be improved by pre-soaking the seed for 12 hours or by scarification[206]. They germinate best in the light[206]. The autumn sowing should be made as late as possible because any plants with roots more than 3mm in diameter in the spring will quickly run to seed if cold temperatures are followed by daylengths longer than 12½ hours[206].

nwatta Succeeds in moist soils when grown in partial shade[200]. Prefers a moist neutral to alkaline soil[238] and a sunny position in a heavy soil[22]. Plants are best grown in a light well-drained soil if the roots are required for culinary use[200, 206]. Tolerates a pH in the range 4.6 to 7.8. The top growth dies back at temperatures a little above freezing, but the roots tolerate much lower temperatures[206] and can be left in the ground all winter to be harvested as required. **Burdock** is cultivated for its edible root in Japan, there are some named varieties[183]. Spring-sown seed produces edible roots in late summer and autumn, whilst autumn sown crops mature in the following spring or early summer[206]. Although the plants are quite large, it is best to grow them fairly close together (about 15cm apart, or in rows 30cm apart with the plants 5 - 8cm apart in the rows) since this encourages the development of long straight roots[206]. The seed head has little hooked prickles and these attach themselves to the hairs or clothing of passing creatures and can thus be carried for some considerable distance from the parent plant[4]. The plants usually self-sow freely[238]. The flowers are very attractive to bees and butterflies[206]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fleshy. Thick or swollen - fibrous or tap root [2-1].

4.2.30 *Vaccinium corymbosum*

High-Bush Blueberry, American Blueberry, Swamp Blueberry, Blueberry
3 tlin 8 cyuc 4 kcaak 0 tcan 1 dwat 2 m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli frusflat
hpa7tmwatli dyatxre7t hjonli

drutta *Vaccinium corymbosum* is a deciduous Shrub growing to 2 m (6ft) by 2 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from May to June, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Fruit Leaves Edible Uses: TeaFruit - raw or cooked[2, 3, 43, 62, 161]. It is usually sweet and juicy, though the flavour can be variable[11]. It can be used in pies, pastries, cereals, jellies etc[183]. The fruit can also be dried and used like raisins[183]. The fruit is rich in vitamin C[201]. The fruit is about 15mm in diameter[200]. A tea is made from the leaves and dried fruit[101].

dwatta Astringent Pectoral Vitamin CAstringent, pectoral[201].

nrakta Eastern N. America - Nova Scotia to Quebec and south to Florida.. **ksakta** Swamps, low wet woods, pine barrens and dry uplands[43].

propta Seed - sow late winter in a greenhouse in a lime-free potting mix and only just cover the seed[78]. Stored seed might require a period of up to 3 months cold stratification[113]. Another report says that it is best to sow the seed in a greenhouse as soon as it is ripe[200]. Once they are about 5cm tall, prick the seedlings out into individual pots and grow them on in a lightly shaded position in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of greenhouse, May/June in a shady position in a compost that contains some peat[113]. Cuttings of half-ripe wood, 5 - 8cm with a heel, August in a frame[78]. Slow and difficult. Cuttings of mature wood, harvested in November and stored in a fridge then planted in a frame in March. Layering in late summer or early autumn[78]. Another report says that spring is the best time to layer[200]. Takes 18 months[78]. Division of suckers in spring or early autumn[113].

nwatta Landscape Uses: Border, Massing, Seashore. Requires a moist but freely-draining lime free soil, preferring one that is rich in peat or a light loamy soil with added leaf-mould[11, 200]. Prefers a very acid soil with a pH in the range of 4.5 to 6, plants soon become chlorotic when lime is present. Succeeds in full sun or light shade though it fruits better in a sunny position[200]. Requires shelter from strong winds[200]. Hardy to about -25°C[184]. Often cultivated for its edible fruit in America[183], it is the most common and successful blueberry to be cultivated in Britain[11]. There are many named varieties[183]. A very variable plant, it usually blossoms freely in Britain[11]. Plants are at least partially self-sterile, more than one variety is required in order to obtain good yields of fruit[182]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. leave the fruit on the shrub until the last minute, as the fruit is very acidic and will not ripen after being picked. Does not grow well with blackberries or raspberries[201]. Closely related to *V. atrococcum* and *V. virgatum*[182]. Plants in this genus are notably resistant to honey fungus[200]. Special Features:Attracts birds, North American native, Edible, Wetlands plant, Attracts butterflies, Attractive flowers or blooms. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

4.2.31 *Rubus canadensis*

American Dewberry, Smooth blackberry
3 tlin 7 cyuc 4 kcaak 1 tcan 1 dwat 2.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta *Rubus canadensis* is a deciduous Shrub growing to 2.5 m (8ft 2in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in July. The species is hermaphrodite (has both male and female organs) and is

apomorphic (reproduce by seeds formed without sexual fusion). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit**Edible Uses:** Fruit - raw or cooked in pies, jams etc[2, 3, 43, 105, 183]. Sweet, juicy and richly flavoured, it is generally preferred to most other species of blackberries[2, 183]. The fruit can be pressed into cakes and then dried for later use[257]. The fruit can be up to 25mm long[235].

tcanta DyeA purple to dull blue dye is obtained from the fruit[168].

dwatta Astringent DysenteryThe stems and the fruit have been used in the treatment of dysentery[257]. A decoction of the root has been used in the treatment of dysentery[257].

nrakta North-eastern N. America - Newfoundland to Michigan and North Carolina. ksacta Thickets, woods and clearings[43, 235].

propta Seed - requires stratification and is best sown in early autumn in a cold frame. Stored seed requires one month stratification at about 3°C and is best sown as early as possible in the year. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Cuttings of half-ripe wood, July/August in a frame[200]. Tip layering in July. Plant out in autumn. Division in early spring or just before leaf-fall in the autumn[200].

nwatta Easily grown in a good well-drained loamy soil in sun or semi-shade[1, 11, 200]. This species is a blackberry with biennial stems, it produces a number of new stems each year from the perennial rootstock, these stems fruit in their second year and then die[200]. The stems are free from prickles[235]. The plant produces apomorphic flowers, these produce fruit and viable seed without fertilization, each seedling is a genetic copy of the parent[200]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.32 Allium moly

Golden Garlic, Ornamental Onion

3 tlin 9 cyuc 4 kcaak 0 tcan 2 dwat m hkuc

htut cyutli hgatkuyctup hwicli hrasjlut hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

drutta Allium moly is a BULB growing to 0.3 m (1ft) by 0.1 m (0ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 7 and is not frost tender. It is in leaf from September to ?, in flower from June to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves Root**Edible Uses:** Bulb - raw or cooked. A pleasant mild garlic flavour, when sliced it makes a very nice addition to salads and can also be used as a flavouring in cooked foods[K]. The bulbs are about 25mm in diameter[200]. Leaves - raw or cooked. Flowers - raw. The yellow flowers make an attractive garnish on salads and have a pleasant onion flavour[K].

tcanta RepellentThe juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20].

dwatta Although no specific mention of medicinal uses has been seen for this species, members of this genus are in general very healthy additions to the diet. They contain sulphur compounds (which give them their onion flavour) and when added to the diet on a regular basis they help reduce blood cholesterol levels, act as a tonic to the digestive system and also tonify the circulatory system[K].

nrakta Europe - Mediterranean in south-western Europe and northern Africa. ksacta Shady rocks and screes in mountains[90]. Limestone rubble[190].

propta Seed - sow spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle - if you want to produce clumps more quickly than put three plants in each pot. Grow them on in the greenhouse for at least their first winter and plant them out into their permanent positions in spring once they are growing vigorously and are large enough. Division in spring. Very easy, the plants divide successfully at any time in the growing season and the divisions can be planted straight out into their permanent positions if required. Plants sometimes produces bulbils, these can be potted up as soon as they are ripe and planted out in late spring.

nwatta Landscape Uses:Border, Container, Foundation, Massing, Rock garden, Woodland garden. An easily grown plant[203], preferring a sunny position in a light well-drained soil[1, 90]. Established plants are fairly drought tolerant[190]. The bulbs should be planted fairly deeply[1]. The dormant bulbs are fairly hardy and will withstand soil temperatures down to at least -10°C[214]. There are some named forms selected for their ornamental value[203]. The flowers are softly scented[245]. Some forms of this species, especially A. moly bulbiferum[203], produce bulbils in the flowering head[42] and can be invasive[203]. The species type is sometimes considered to be invasive, though it has not proved so with most people[203]. It is useful for naturalising between shrubs and grows well at the base of a beech hedge in a wet garden[203]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. It is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. **Special Features:**Not North American native, Naturalizing, Attracts butterflies, Suitable for dried flowers.

4.2.33 Prunus armeniaca mandschurica

Manchurian apricot

3 tlin 9 cyuc 4 kcaak 3 tcan 3 dwat m hkuc

hmimhtut cyutli tcup hwicli hrasjlut hpa7tli flatprikliwis hpa7tmwatli fyif hjonli

drutta Prunus armeniaca mandschurica is a deciduous Tree growing to 6 m (19ft) by 4 m (13ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. The flowers are pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista This species produces hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. Usually present in too small a quantity to do any harm, any very bitter seed or fruit should not be eaten[65]. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death. Oral doses of 50g of hydrogen cyanide can be fatal (= 30g of kernels or 50-60 kernels at 2 mg HCN/g kernel) [301].

kcakta Edible Parts: Fruit Oil Seed**Edible Uses:** Gum Oil**Edible Portion:** Fruit, Seeds. Fruit - raw, cooked or dried for later use[1, 2, 3, 34]. The best forms are soft and juicy with a delicious rich flavour[K]. Wild trees in the Himalayas yield about 47.5kg of fruit per year[194]. The fruit of the wild form contains about 6.3% sugars, 0.7% protein, 2.5% ash, 2.5% pectin. There is about 10mg vitamin C per 100g of pulp[194]. The fruit is about 5cm in diameter and contains one large seed[200]. Seed - raw or cooked[183]. Bitter seeds should be eaten in strict moderation, but sweet ones can be eaten freely[132]. The bitter seeds can be used as a substitute for bitter almonds in making marzipan etc[4]. An edible gum is obtained from the trunk[64]. The seed contains up to 50% of an edible semi-drying oil[4, 57, 61, 183]. **Carbon Farming - Staple Crop:** oil.

tcanta Cosmetic Dye Gum Oil WoodAn edible semi-drying oil is obtained from the seed[57]. Used for light-

ing[194]. The oil has a softening effect on the skin and so it is used in perfumery and cosmetics, and also in pharmaceuticals[4, 61]. A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Wood - handsome, hard, durable. Agricultural implements etc[146, 194]. Carbon Farming - Industrial Crop: oil. Espalier: tree or other plants that is trained to grow flat against a support (such as a trellis or wall).

dwatta Analgesic Anthelmintic Antiasthmatic Anti-inflammatory Antipyretic Antiseptic Antispasmodic Antitussive Astringent Cancer Demulcent Emetic Emollient Expectorant Laxative Ophthalmic Pectoral Sedative Skin Tonic Vitamin C VulneraryApricot fruits contain citric and tartaric acid, carotenoids and flavonoids[283]. They are nutritious, cleansing and mildly laxative[254]. They are a valuable addition to the diet working gently to improve overall health. The salted fruit is antiinflammatory and antiseptic[283]. It is used medicinally in Vietnam in the treatment of respiratory and digestive diseases[283]. Antipyretic, antiseptic, emetic, ophthalmic[194]. The flowers are tonic, promoting fecundity in women[218]. The bark is astringent[254]. The inner bark and/or the root are used for treating poisoning caused by eating bitter almond and apricot seeds (which contain hydrogen cyanide)[218]. Another report says that a decoction of the outer bark is used to neutralize the effects of hydrogen cyanide[238]. The decoction is also used to soothe inflamed and irritated skin conditions[254]. The seed is analgesic, antihelmintic, antiasthmatic, antispasmodic, antitussive, demulcent, emollient, expectorant, pectoral, sedative and vulnerary[176, 218]. It is used in the treatment of asthma, coughs, acute or chronic bronchitis and constipation[176, 279]. The seed contains 'laetrile', a substance that has also been called vitamin B17[218]. This has been claimed to have a positive effect in the treatment of cancer, but there does not at present seem to be much evidence to support this[K]. The pure substance is almost harmless, but on hydrolysis it yields hydrocyanic acid, a very rapidly acting poison - it should thus be treated with caution[218]. In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta E. Asia - N. China, Mongolia. ksacta Temperate. Most trees growing apparently wild have escaped from cultivation but there are pure stands of the trees in Tibet on mountain slopes in sparse forests at elevations of 700 - 3000 metres[266].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Difficult[113]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Difficult. Layering in spring.

nwatta Industrial Crop: Oil Management: Standard Regional Crop Staple Crop: OilClimate: boreal to warm temperate. Humidity: semi-arid to humid. Landscape Uses: Specimen. Requires a well-drained moisture retentive fertile soil in a warm sunny position[11, 200]. Succeeds in light shade but fruits better in a sunny position[200]. Thrives in a loamy soil, doing well on limestone[11]. Prefers some chalk in the soil but is apt to become chlorotic if too much is present[11]. Prefers a pH in the range 6.5 to 7.5[200]. Dislikes clay soils[37, 61]. Intolerant of saline soils[200]. Trees drop their fruit buds if there is a summer drought[200]. The apricot is widely cultivated for its edible fruit in temperate areas that have long hot summers, there are many named varieties[183, 200]. The tree is perfectly hardy in Britain but it usually flowers very early in the spring and the flowers are then liable to be destroyed by frosts[11]. It really requires a more continental climate (with its clearly defined seasons) than it gets in Britain. However, if given the benefit of a south or west facing wall and some protection from frosts when it is in flower, reasonable crops can usually be produced in southern England[1, 219]. The plants are self-fertile[200], but hand pollination would be advisable since they are normally flowering before many pollinating insects are active. In Britain apricots are usually grown on plum rootstocks,

'St. Julien A' is the most widely used[200]. The dwarfing rootstock 'Pixie' is also a possibility, but this must be double worked with 'St. Julien A' because it is incompatible with apricots[200]. Any pruning should be carried out in the summer to allow rapid healing and therefore less risk of infection[201]. Oats should not be grown near apricots because their roots have an antagonistic effect on the roots of the apricot[201]. Tomatoes and potatoes are also bad companions for apricots[201]. If nasturtiums (*Tropaeolum* spp) are grown under apricots they will make the fruit less palatable to insects, though this is not detectable by the human palate[201]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Edible, Not North American native, Fragrant flowers, Attractive flowers or blooms. Carbon Farming - Cultivation: regional crop only. Management: standard. Espalier.

4.2.34 *Prunus maritima*

Beach Plum, Graves' plum

3 tlin 7 cyuc 4 kca3 3 tcan 1 dwat m hkuc
htut cyutli kyuctcup hwicli hrasj|lutnyik hpa7tli flatprikwis
hpa7mtwatli xre7t hjonli

drutta *Prunus maritima* is a deciduous Shrub growing to 2.5 m (8ft 2in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate maritime exposure.

pcista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcka2a Edible Parts: Fruit SeedEdible Uses: Fruit - raw or cooked[2, 55, 102]. Very variable in quality[11], the best forms are sub-acid to sweet, the fruit can be eaten out of hand, used in pies, preserves etc or be dried for later use[46, 171, 183]. The fruit is about 15mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta Dye Soil stabilizationA green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Plants have extensive root systems and can be used for binding sand along the coast[200].

dwatta Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta Eastern N. America - New Brunswick to Virginia. ksacta Light gravelly or sandy soils near the coast[43, 182].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Thrives in a well-drained moisture-retentive loamy soil, doing well on limestone[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Requires a sunny position[11]. Tolerates maritime exposure[11, 102]. The beach plum is cultivated

for its edible fruit in N. America, there are some named varieties[183]. The fruit is often sold in local markets[46] and the plant is of potential commercial importance[171]. The fruit seldom ripens when grown in the interior of America[2]. The cultivar 'Eastham' has large well-flavoured fruit and is a heavy cropper[200]. 'Hancock' is an early ripening form with sweet juicy fruit[200]. 'Squibnocket' is of high quality and is also a good sand binder[200]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 6 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A clumping plant, forming a colony from shoots away from the crown but with a limited spread [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.35 Ribes aureum

Golden Currant

3 tlin 8 cyuc 4 kcaok 0 tcan 1 dwat 2.4 m hkuc
hmmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flat-prikrlwis hpa7tmwatli xre7t hjonli

drutta Ribes aureum is a deciduous Shrub growing to 2.4 m (7ft 10in). See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower in April, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Flowers Fruit Edible Uses: Fruit - raw or cooked[2, 11, 62, 101, 257]. They make an acceptable dessert fruit[K] and are also used in jellies, sauces and pies[183]. The fruit can also be dried for winter use[46, 85]. Fairly large and flavourful[85, 183]. The fruit is about 5mm in diameter[200]. Flowers - raw. A very sweet flavour[85].

dwatta Antiinflammatory Salve The dried and pulverized inner bark has been sprinkled on sores[257]. A decoction of the inner bark has been used in the treatment of leg swellings[257].

nrakta Western N. America - Saskatchewan to Washington, south to California. Naturalized in C. Europe. ksacta By streams, in ravines and on mountain slopes[60, 62]. Rocky slopes and sandy bluffs[274].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 3 months cold stratification at -2 to +2°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or more. Prick out the seedlings into individual pots when they are large enough to handle and grow them out in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11]. Succeeds in full sun but is also quite tolerant of shade though not fruiting so well in such a position[11]. Grows well on exposed dry sites[85]. Very tolerant of being transplanted[85]. Plants can spread by means of underground rhizomes, especially when growing in moist conditions[164]. Hardy to about -20°C[200]. The fruit can be red, black, yellow, golden or reddish-brown[164]. A very ornamental plant[1], it is closely

allied to R. odoratum[11]. Plants can harbour a stage of white pine blister rust, so should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200]. Sometimes cultivated for its edible fruit, there are some named varieties[183]. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.36 Vaccinium myrtillus

Bilberry, Whortleberry

3 tlin 7 cyuc 4 kcaok 1 tcan 3 dwat m hkuc
hmmimhtut cyutli tcut hwicli hrasjlut hpa7tli frusflat hpa7tmwatli fyifxre7t hjonli

drutta Vaccinium myrtillus is a deciduous Shrub growing to 0.2 m (0ft 8in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to June, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista High tannin content may cause digestive disorders - avoid prolonged use or high doses. Avoid in pregnancy. Avoid if on anticoagulant therapy (e.g. warfarin) [301].

kcakta Edible Parts: Fruit Leaves Edible Uses: Tea Fruit - raw or cooked[183]. Sweet and very tasty[2, 3, 5, 7, 8, 9, 13], they make an excellent preserve, their small seeds making them suitable for jam[4]. A slightly acid flavour when eaten raw[4]. The fruit can be dried and used like currants[12]. The fruit is up to 10mm in diameter[200]. A tea is made from the leaves[4, 177, 183].

tcanta Dye Ink A green dye is obtained from the leaves and the fruit and is used to colour fabrics[7]. A blue or black dye is obtained from the fruit[100, 141]. This can be used as an ink[66].

dwatta Antidiarrhoeal Antiemetic Antiseptic Astringent Diuretic Hypoglycaemic Kidney Ophthalmic Tonic Urinary - The dried leaves of bilberries are used in the treatment of a variety of complaints[4]. These leaves should be harvested in early autumn, only green leaves being selected, and then dried in gentle heat[4]. The leaves should not be used medicinally for more than 3 weeks at a time[254]. A tea made from the dried leaves is strongly astringent, diuretic, tonic and antiseptic for the urinary tract[4]. It is also a remedy for diabetes if taken for a prolonged period[4]. Another report says that the leaves can be helpful in pre-diabetic states but that they are not an alternative to conventional treatment[254]. The leaves contain glucoquinones, which reduce the levels of sugar in the blood[238]. A decoction of the leaves or bark is applied locally in the treatment of ulcers and in ulceration of the mouth and throat[4]. A distilled water made from the leaves is an excellent eyewash for soothing inflamed or sore eyes[7]. Whilst the fresh fruit has a slightly laxative effect upon the body, when dried it is astringent and is commonly used in the treatment of diarrhoea etc[4, 7, 254]. The dried fruit is also antibacterial and a decoction is useful for treating diarrhoea in children[254]. The skin of the fruits contains anthocyanin and is specific in the treatment of hemeralopia (day-blindness)[7]. The fruit is a rich source of anthocyanosides, which have been shown experimentally to di-

late the blood vessels[238], this makes it a potentially valuable treatment for varicose veins, haemorrhoids and capillary fragility[254].

nrakta Europe, including Britain, from Iceland south and east to Spain, Macedonia, the Caucasus and N. Asia ksacta Heaths, moors and woods on acid soils to 1250 metres[17, 186].

propta Seed - sow late winter in a greenhouse in a lime-free potting mix and only just cover the seed[78]. Stored seed might require a period of up to 3 months cold stratification[113]. Another report says that it is best to sow the seed in a greenhouse as soon as it is ripe[200]. Once they are about 5cm tall, prick the seedlings out into individual pots and grow them on in a lightly shaded position in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 5 - 8cm with a heel, August in a frame[78]. Slow and difficult. Cuttings of mature wood in late autumn. Layering in late summer or early autumn[78]. Another report says that spring is the best time to layer[200]. Takes 18 months[78]. Division of suckers in spring or early autumn[113].

nwatta Requires a moist but freely-draining lime free soil, preferring one that is rich in peat or a light loamy soil with added leaf-mould[11, 200]. Prefers a very acid soil with a pH in the range of 4.5 to 6, plants soon become chlorotic when lime is present. Succeeds in full sun or light shade though it fruits better in a sunny position[17, 200]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. Tolerates some shade, succeeding in light woodland. Very tolerant of wind and exposure[186]. Plants do not always do well in sheltered positions and they fruit better in an exposed position[115]. They can also form the ground layer in acid woods[186]. A freely suckering shrub when growing well[182]. Plants quickly regenerate from below ground level if they are burnt and also tolerate some grazing[186]. One report says the plant is self-sterile[3], another that it is self-fertile[17]. The fruits are relished by wildlife and the plants provide food for a number of insect species[186]. Plants in this genus are notably resistant to honey fungus[200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is flat with shallow roots spreading near the soil surface [2-1].

4.2.37 *Camassia leichtlinii*

Wild Hyacinth, Large camas, Suksdorf's large camas
3 tin 7 cyuc 4 kcaok 2 tcan 0 dwat 1 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyikfrjp hpa7tli flatprikliw hpa7tmwatli xre7t hjonli

drutta *Camassia leichtlinii* is a BULB growing to 1 m (3ft 3in) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in leaf from March to August, in flower from June to July, and the seeds ripen in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: RootEdible Uses: Bulb - raw or cooked[94, 105, 177]. The bulb is about 3cm in diameter[270], eaten raw it has a mild, starchy flavour, but a gummy texture that reduces the enjoyment of it somewhat[K]. It is excellent when slow baked, however, developing a sweet flavour and making a very good potato substitute[183, 256, K]. The cooked bulb can also be dried for later use[183] or ground into a powder and used as a thickener in soups or as an additive to cereal flours when making bread, cakes etc[161]. The bulbs can be boiled down to make a molasses, this was used on festival occasions by various Indian tribes[183]. One report says that the bulbs contain inulin (a starch that cannot be digested by humans) but that this breaks down when the bulb is cooked slowly to form the sugar fructose which is sweet and easily digested[256].

nrakta Western N. America - British Columbia to S. California. ksacta Meadows, prairies and hillsides that are moist,

at least in early spring.

propta Seed - best sown as soon as it is ripe in a cold frame[134]. The seed can also be sown in a cold frame in spring[134]. It usually germinates in 1 - 6 months at 15°C, but it can be erratic[138]. Sow the seed thinly so that it does not need to be thinned and allow the seedlings to grow on undisturbed for their first year. Give an occasional liquid feed to ensure that the plants do not become nutrient deficient. When the plants are dormant in late summer, pot up the small bulbs putting 2 - 3 bulbs in each pot. Grow them on for another one or two years in a cold frame before planting them out when dormant in late summer. Offsets in late summer. The bulb has to be scored in order to produce offsets.

nwatta A very easily grown plant, it succeeds in almost any soil[42] and is tolerant of considerable neglect once it is established[K]. Grows well in heavy clay soils. Prefers a rather heavy loam[1] that has plenty of moisture in spring but does not remain wet over the winter[138, 200]. Dislikes dry soils[200]. Prefers full sun but tolerates partial shade[138, 200]. A very ornamental plant[1], there are many named varieties[200]. Plants often self-sow[K]. A good bee plant[108]. Plants can be naturalized in damp grass, this should not be trimmed until mid to late summer when the bulbs have flowered and the leaves have died down[134]. This species can be confused with certain poisonous bulbs in the genus *Zigadenus*[85]. Plant the bulbs 7 - 10cm deep in early autumn and then leave undisturbed[1]. The bulbs should be planted about 20cm deep[233]. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is a bulb.

4.2.38 *Amaranthus hypochondriacus*

Prince's Feather, Prince-of-wales feather
3 tin 10 cyuc 4 kcaok 2 tcan 3 dwat 1.2 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliw hpa7tmwatli fyif hjonli

drutta *Amaranthus hypochondriacus* is an ANNUAL/PERENNIAL growing to 1.2 m (4ft) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is frost tender. It is in leaf from April to October, in flower from July to August, and the seeds ripen from August to September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista No members of this genus are known to be poisonous, but when grown on nitrogen-rich soils they are known to concentrate nitrates in the leaves. This is especially noticeable on land where chemical fertilizers are used. Nitrates are implicated in stomach cancers, blue babies and some other health problems. It is inadvisable, therefore, to eat this plant if it is grown inorganically.

kcakta Edible Parts: Leaves SeedEdible Uses: ColouringYoung leaves - cooked as a spinach[183, 238]. Rich in vitamins and minerals, they have a mild flavour[K]. Seed - raw or cooked. They can be used as a cereal substitute. They can also be popped in much the same way as popcorn[183]. The seed can be soaked for 12 hours in warm water and then allowed to sprout for about 11 days[244]. They can then be added to salads[183]. Very small but the seed is easy to harvest and very nutritious. The seed can be cooked whole, and becomes very gelatinous like this, but it is rather difficult to crush all of the small seeds in the mouth and thus some of

the seed will pass right through the digestive system without being assimilated[K]. A red pigment obtained from the plant is used as a food colouring[238].

tcanta DyeYellow and green dyes can be obtained from the whole plant[168]. A red dye obtained from the plant (the report does not specify which part of the plant) is used as a colouring in foods and medicines[238].

dwatta Antidiarrhoeal AstringentThe whole plant contains tannin and is astringent[238, 254]. It is used internally in the treatment of diarrhoea and excessive menstruation[238, 254]. It can be used as a gargle to soothe inflammation of the pharynx and to hasten the healing of ulcerated mouths[254], whilst it can also be applied externally to treat vaginal discharges, nosebleeds and wounds[238]. The plant can be used fresh or it can also be harvested when coming into flower and dried for later use[238].

nrakta Southern N. America. ksacta A weed of wasteland and agricultural land.

propta Seed - sow late spring in situ. An earlier sowing can be made in a greenhouse and the plants put out after the last expected frosts. Germination is usually rapid and good if the soil is warm[133]. A drop in temperature overnight aids germination[133]. Cuttings of growing plants root easily[206].

nwatta Prefers a well-drained fertile soil in a sunny position[200]. Requires a hot sheltered position if it is to do well[K]. Tolerates a pH in the range 5.2 to 7.5. Plants should not be given inorganic fertilizers, see notes above on toxicity. Often cultivated, especially in tropical areas, for its edible leaves and seeds, there are many named varieties[183]. This is the most robust and highest yielding of the grain amaranths, though it is late maturing and therefore less suitable for northern areas[183]. Most if not all members of this genus photosynthesize by a more efficient method than most plants. Called the 'C4 carbon-fixation pathway', this process is particularly efficient at high temperatures, in bright sunlight and under dry conditions[196]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is clumping, giving the plant a clumping habit. The predictable growth behaviour makes it easier to maintain without having to apply containment methods[2-1].

4.2.39 Rheum × hybridum

Garden Rhubarb

3 tlin 8 cyuc 4 kcak 1 tcan 3 dwat 1.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjutnyik hpa7tli flatprikliwis
hpa7tmwatli hjonli

drutta Rheum × hybridum is a deciduous Perennial growing to 1.5 m (5ft) by 1.5 m (5ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4.

The flowers are pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It cannot tolerate atmospheric pollution.

pcista The leaves contain high concentrations of oxalic acid[34, 76]. Oxalic acid can lock up certain minerals (especially calcium) in the body, leading to nutritional deficiency. Cooking the plant will reduce the concentration of oxalic acid. Another report says that the leaves have the same concentration of oxalic acid in the stems as they do in the leaves and it is not the oxalic acid that makes them poisonous. It says that any toxic properties of the leaves is more likely to be due to the presence of glycosides[142]. People with a tendency to rheumatism, arthritis, gout, kidney stones or hyperacidity should take especial caution if including this plant in their diet since it can aggravate their condition[238].

kcakta Leaf stem - raw or cooked[1, 2, 46, 105, 200]. An acid taste, it is used as a fruit substitute in spring, usually stewed with sugar and used in pies, jams etc[183]. The juice strained from stewed rhubarb can add colour and flavour to a fruit punch[183]. It is best not to eat large quantities of the stems because of their oxalic acid content - see the notes above on toxicity. Immature flowers - cooked and used like cauliflower[183]. One report says that the plant contains

0.7% rutin[240]. It does not specify which part of the plant, though it is likely to be the leaves[K].

tcanta The leaves can be simmered in hot water to make an insecticide.

dwatta Rhubarb has a long and proven history of herbal usage, its main effect being a positive and balancing effect upon the whole digestive system. It is one of the most widely used herbs in Chinese medicine[238]. The main species used is *R. palmatum*. Though the chemistry varies slightly, this species is used interchangeably[238]. Another report says that this species contains only small quantities of the medicinally active compounds and so it is only used as a mild laxative[244]. The root is anticholesterolemic, antispasmodic, antispasmodic, antitumor, aperient, astringent, cholagogue, demulcent, diuretic, laxative, purgative, stomachic and tonic[4, 37, 57, 61, 171, 238]. Small doses act as an astringent tonic to the digestive system, whilst larger doses act as a mild laxative[232]. The root is taken internally in the treatment of chronic constipation, diarrhoea, liver and gall bladder complaints, haemorrhoids, menstrual problems and skin eruptions due to an accumulation of toxins[238]. This remedy is not prescribed for pregnant or lactating women, nor for patients with intestinal obstruction[238]. Externally, the root is used in the treatment of burns[238]. The roots are harvested in October from plants that are at least six years old, they are then dried for later use[4]. A homeopathic remedy is prepared from the dried root[232]. This is used especially in the treatment of diarrhoea in teething children[232].

nrakta Cosmopolitan ksacta Garden Hybrid

propta Seed - best sown in autumn in a shaded cold frame[200]. The seed can also be sown in spring in a cold frame. When large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse or cold frame for their first winter, planting them out in the spring. This species is a hybrid and will not necessarily breed true to type from seed. However, this does give the opportunity to look for superior plants from amongst the seedlings. Division in early spring or autumn[1, 111]. Divide up the rootstock with a sharp spade or knife, making sure that there is at least one growth bud on each division. Larger divisions can be planted out direct into their permanent positions. We have found that it is better to pot up the smaller divisions and grow them on in light shade in a cold frame until they are well established before planting them out in late spring or early summer.

nwatta *R. hybridum* is an herbaceous perennial plant. A very easily grown plant, tolerant of considerable neglect, it prefers a deep, fertile, moderately heavy, humus rich, moisture retentive, well-drained soil in sun or semi-shade[200, 264]. It succeeds in most soils provided the drainage is good[200] and will grow in the dappled shade of trees so long as there is sufficient side light[K]. It grows well in heavy clay soils. Tolerates acid conditions but prefers a pH in the range 6.5 to 7[200]. Plants are very cold hardy, tolerating temperatures down to at least -20°C[200]. The plant does not like hot summers, however, and is likely to die in warmer climates[264]. Rhubarb is a long-lived and almost indestructible perennial plant[264]. It is often cultivated for its edible leaf stems, there are many named varieties[74, 183]. Most cultivars produce edible stems from spring to early summer, though 'Glaskin's Perpetual' can be harvested throughout the summer. By digging up the roots in the autumn and exposing them to frost, earlier growth will be initiated. These roots can then be transferred to a cold frame or other protected area where they will produce their edible stems in late winter. It is also possible to produce earlier crops outdoors by covering the plants with a layer of straw and an upturned bucket. This species is probably of hybrid origin, *R. rhaponticum* × *R. palmatum*[200]. It hybridizes freely with other members of the genus[200]. Plants in this genus seem to be immune to the predations of rabbits[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

4.2.40 Cichorium intybus

Chicory, Radicchio, Succory, Witloof

3 tlin 7 cyuc 4 kcak 3 tcan 3 dwat 1.5 m hkuc

herbal medicine, approve Cichorium intybus for loss of appetite, dyspepsia (see [302] for critics of commission E).

drutta Cichorium intybus is a PERENNIAL growing to 1.5 m (5ft) by 0.5 m (1ft 8in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to October, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid and very alkaline soils. It cannot grow in the shade. It prefers moist soil.

pcista Excessive and continued use may impair function of the retina[268]. Slight potential for sensitization [301]

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Coffee Leaves - raw or cooked[2, 4, 5, 9, 27, 33, 171]. The leaves are rather bitter, especially when the plants are flowering[4]. The leaves are often blanched by excluding light, either by removing all the leaves and then earthing up the new growth, or by covering the plant with a bucket or something similar. Whilst this greatly reduces any bitterness, there is also a corresponding loss of vitamins and minerals[K]. The blanched leaves are often used in winter salads (they are known as chicons) and are also cooked[132, 200]. The unblanched leaves are much less bitter in winter and make an excellent addition to salads at this time of year[K]. A nutritional analysis of the leaves is available[218]. Flowers - raw[52]. An attractive addition to the salad bowl[183], but rather bitter[K]. Root - cooked like parsnip[5, 7, 9, 13, 21, 27, 46]. The boiled young roots form a very palatable vegetable[4]. The root is said to be an ideal food for diabetics because of its inulin content[9]. Inulin is a starch that cannot be digested by humans, it tends to pass straight through the digestive system and is therefore unlikely to be of use to a diabetic[K]. However, the inulin can be used to make a sweetener that is suitable for diabetics to use[K]. Chicory root is free of harmful ingredients, and is essentially a concentrated combination of three sugars (pentose, levulose and dextrose) along with taraxaric acid (the bitter principle of dandelion)[269]. It is especially important as source of levulose[269]. Roots are used in seasoning soups, sauces and gravies, and to impart a rich deep colour[269]. The roasted root is used as a caffeine-free coffee adulterant or substitute[2, 4, 5, 7, 13, 21, 27, 46]. Young roots have a slightly bitter caramel flavour when roasted, roots over 2 years old are much more bitter[238].

tcanta Biomass Compost The roots have the potential to be used for the production of biomass for industrial use[132]. They are rich in the starch 'inulin' which can easily be converted to alcohol[269]. A blue dye has been obtained from the leaves[4]. The flowers are an alternative ingredient of 'QR' herbal compost activator[32]. This is a dried and powdered mixture of several herbs that can be added to a compost heap in order to speed up bacterial activity and thus shorten the time needed to make the compost[K]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch. Nectary, Insect shelter

dwatta Appetizer Bach Cardiac Cholagogue Depurative Digestive Diuretic Hypoglycaemic Laxative Tonic Warts Chicory has a long history of herbal use and is especially of great value for its tonic affect upon the liver and digestive tract[254]. It is little used in modern herbalism, though it is often used as part of the diet. The root and the leaves are appetizer, cholagogue, depurative, digestive, diuretic, hypoglycaemic, laxative and tonic[4, 7, 9, 13, 21, 46, 222]. The roots are more active medicinally[222]. A decoction of the root has proved to be of benefit in the treatment of jaundice, liver enlargement, gout and rheumatism[4]. A decoction of the freshly harvested plant is used for treating gravel[4]. The root can be used fresh or dried, it is best harvested in the autumn[9]. The leaves are harvested as the plant comes into flower and can also be dried for later use[9]. The root extracts have experimentally produced a slower and weaker heart rate (pulse)[222]. The plant merits research for use in heart irregularities[222]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Possessiveness', 'Self-love' and 'Self-pity'[209]. The latex in the stems is applied to warts in order to destroy them[218]. The German Commission E Monographs, a therapeutic guide to

herbal medicine, approve Cichorium intybus for loss of appetite, dyspepsia (see [302] for critics of commission E).

nrakta Europe, including Britain, from Scandinavia south and east to N. Africa and W. Asia. ksacta Grassy meadows and arable land, especially on chalk[5, 13].

propta Seed - sow the wild form or cultivars being grown for their roots in May or June in situ. Cultivars being grown for their edible leaves can be sown in April for a summer crop or in June/July for a winter crop. Sow them in situ or in pots and then plant them out as soon as they are large enough.

nwatta Prefers a sunny position in any moderately fertile well-drained moisture retentive soil[1, 14, 52]. Prefers a pH 5.5 to 7[200]. Tolerates a pH in the range 4.5 to 8.3. Chicory grows on any type of soil but, when cultivated, grows best on mellow, deeply tilled, fertile soil or sandy loam[269]. A cool weather crop, it tolerates only moderate summer temperatures and requires well-distributed rainfall, with good drainage, or some irrigation in drier areas[269]. Chicory roots deeply in relatively short time; soil too wet for beans and small grains is not suitable[269]. To insure proper root-growth, apply lime or marl to acid soil to neutralize acidity[269]. Chicory is reported to tolerate a pH in the range of 4.5 to 8.3, an annual rainfall of 30 to 400 cm and an annual mean biotemperature of 6° to 27°C[269]. Chicory is an excellent winter salad. It is often cultivated, especially in Europe, for its edible leaves and for its roots which are used to make a coffee substitute. There are many named varieties[46, 132, 183] and, by careful selection of cultivars and sowing times, fresh leaves can be obtained all year round. There are three main types of chicory grown for their leaves, there are many cultivars of each form: A bitter-tasting loose-leaved form is grown as a green winter vegetable, especially in southern Italy. A narrow-leaved, witloof or Belgian form has a compact elongate head (chicon) which is blanched for use in salads or cooked dishes. A broad-leaved (usually red) form produces cabbage-like hearts, these are generally less bitter than the other forms and are eaten raw or cooked. These forms are often used as a winter salad crop[K]. Although a perennial, chicory is usually cultivated as an annual crop, especially when being grown as a winter salad. The winter salad cultivars are usually sown in early summer to make sure that they do not flower in their first year of growth. By late autumn they have formed an overwintering rosette of leaves rather like a cabbage. These leaves can be harvested as required during the winter and the plants will then usually make some new growth (as long as the winter is not too cold) that can be harvested in late winter or early spring. The plants run to flower in the following summer and fail to make an overwintering rosette of leaves for that winter[K]. Chicory can be grown successfully in a meadow or even in a lawn so long as the grass is not cut too short nor too often[K]. It often self-sows freely when well-sited, especially if it is growing in a dry alkaline soil[238]. A good bee plant[24, 108]. A very ornamental plant[1]. The flowers open in the early morning (about 6 - 7 o'clock in Britain) and close around midday[4]. Special Features: Edible, Not North American native, Invasive, Naturalizing. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

4.2.41 Prunus besseyi

Western Sand Cherry

3 tlin 6 cyuc 4 kcaak 2 tcan 1 dwat 1.2 m hkuc hmimhtut cyuthl hgattcup hwicli hrsajlutnyik hpa7tli flatprklwis hpa7tmwatli xre7t hjonli

drutta Prunus besseyi is a deciduous Shrub growing to 1.2 m (4ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought.

pcista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw or cooked[85, 183, 257]. A sweetish flavour, the fruit can also be dried for later use[183]. It makes a rather astringent but tasty jelly[182]. The fruit is a reasonable size, up to 18mm in diameter, and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta Dye Rootstock A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. The plant can be used as a rootstock for plums[160]. It produces mostly dwarf trees that are poorly anchored[183]. Prone to severe suckering[183]. Compatible with most prunes, it is incompatible with damsons and Victoria plums[183]. Resistant to 'Crown Gall'[183]. Trees on this rootstock are productive and very cold hardy[183]. Cuttings are often easy to root but seedlings vary widely[183].

dwatta Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta Central N. America - Manitoba and Minnesota to Kansas and Utah. ksacta Sandy hills, open plains, rocky slopes or shores[43].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Division of suckers in the dormant season. They can be planted out direct into their permanent positions. Layering in spring.

nwatta Landscape Uses: Specimen. Thrives in a well-drained moisture-retentive loamy soil, doing well on limestone[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Succeeds in sun or partial shade though it fruits better in a sunny position[11, 200]. Established plants are drought resistant[160]. A very hardy plant, probably tolerating temperatures down to about -50°C when it is fully dormant[160]. It is cultivated for its edible fruit in warmer climes than Britain[11], there are some named varieties[183]. It flowers very well in this country but does not usually produce much fruit[11]. Another report says that it sometimes fruits abundantly in Britain. The cultivar 'Black Beauty' crops well and has small black sweet fruits[200]. 'Hansens' has large fruits with a good flavour[200]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants are inclined to sucker and can produce dense thickets[160]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Attracts birds, North American native. All or parts of this plant are poisonous, Fragrant flowers, Blooms are very showy.

4.2.42 Helianthus pauciflorus

Stiff Sunflower, Prairie Sunflower
3 tlin 7 cyuc 4 kcaak 1 tcan 0 dwat 1.5 m hkuc
htut cyutli hgatkuyctucp hwicli brasjlutnyik hpa7tli flatprikliwis hpa7tmwatli hjonli

drutta Helianthus pauciflorus is a PERENNIAL growing to 1.5 m (5ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

kcakta Edible Parts: Oil Seed Edible Uses: Oil Carbon Farming Solutions - Staple Crop: protein-oil (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1]. Perennial crops are being developed for their oil-seed. The Land Institute see them as part of a perennial polyculture system [1-1].

tcanta Oil Drought-tolerant and suitable for xeriscaping. Attractive to bees, butterflies and/or birds

nrakta North American. Widespread across the Great Plains, the Rocky Mountains, and the Great Lakes region. Naturalized in the eastern United States and in much of southern Canada (from Alberta to Nova Scotia). ksacta Dry to moderately wet prairies and open areas. Subspecies Helianthus pauciflorus subsp. subrhomboides occurs in dry, open habitats.

propta An easy plant to grow. Division. Herbaceous stem cuttings. Seed; direct sow outdoors in autumn. Self-sows freely.

nwatta Management: Standard Staple Crop: Protein-oil Under Development Climate: boreal to warm temperate. Humidity: semi-arid to humid. Soil pH: 6.1 (mildly acidic) to 7.8 (mildly alkaline). Prefers full sun and mesic to dry conditions. Soil can contain significant amounts of loam, clay loam, sand, or gravelly material. Easy to grow. Carbon Farming Solutions - Cultivation: under development. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1]. Perennial crops are being developed for their oil-seed. The Land Institute see them as part of a perennial polyculture system [1-1]. Several perennial sunflowers are being worked with including prairie natives handling boreal to warm temperate semi-arid conditions: Helianthus maximiliani (Maximilian sunflower), Helianthus tuberosus (Jerusalem artichoke), Helianthus pauciflorus (Stiff sunflower). Less tolerant of boreal conditions but good on poor soils is Helianthus cusickii (Cusick's sunflower) [1-1].

4.2.43 Rhus aromatica

Lemon Sumach, Fragrant sumac
3 tlin 9 cyuc 4 kcaak 2 tcan 2 dwat 1.2 m hkuc
htut cyutli hgatkuyctucp hwicli hrasjlutnyik hpa7tli flatprikliwis hpa7tmwatli nyanhjen hjonli

drutta Rhus aromatica is a deciduous Shrub growing to 1.2 m (4ft) by 1.5 m (5ft in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in April, and the seeds ripen in September. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Bees. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista There are some suggestions that the sap of this species can cause a skin rash in susceptible people, but this has not been substantiated. See also notes in 'Cultivation Details'.

kcakta Edible Parts: Fruit Oil Edible Uses: Drink Oil-Fruit - raw or cooked[2, 22]. The fruit is small with very little flesh, but it is easily harvested and when soaked for 10 - 30 minutes in hot or cold water makes a very refreshing lemonade-like drink (without any fizz of course)[61, 85, 183, K]. The mixture should not be boiled since this will release

tannic acids and make the drink astringent. The fruit can also be dried and ground into a powder then mixed with corn meal and used in cakes, porridges etc[183].

cañta Basketry Dye Mordant Oil Soil stabilization TanninThe leaves are rich in tannin (up to 25%) and can be collected as they fall in the autumn then used as a brown dye or as a mordant[169]. The bark is also a good source of tannin[4]. An oil is extracted from the seeds[4]. It attains a tallow-like consistency on standing and is used to make candles. These burn brilliantly, though they emit a pungent smoke[4]. The plant has an extensive root system and is sometimes planted to prevent soil erosion[200]. The split stems are used in basket making[4, 46, 61].

dwatta Astringent Diuretic DysenteryThe leaves are astringent and diuretic[61, 222]. They were used in the treatment of colds, stomach aches and bleeding[222]. The root bark is astringent and diuretic[4, 222]. An infusion can be used in the treatment of diarrhoea, dysentery. Used externally, it is used to treat excessive vaginal discharge and skin eruptions and also as a gargle for sore throats[254]. Its use is contraindicated if inflammation is present[222]. The root is harvested in the autumn and dried for later use[254]. The fruits are astringent and diuretic[254]. They have been chewed in the treatment of stomach aches, toothaches and gripe[222] and used as a gargle to treat mouth and throat complaints[254]. They help reduce fevers and may be of help in treating late-onset diabetes[254]. Some caution is advised in the use of the leaves and stems of this plant, see the notes above on toxicity.

nrakta Eastern N. America - Quebec to Florida and Indiana to Texas. ksacta Dry rocks, sands and open woods[43], often on limestone outcrops[149].

propta Seed - best sown in a cold frame as soon as it is ripe. Pre-soak the seed for 24 hours in hot water (starting at a temperature of 80 - 90c and allowing it to cool) prior to sowing in order to leach out any germination inhibitors[200]. This soak water can be drunk and has a delicious lemon-flavour. The stored seed also needs hot water treatment and can be sown in early spring in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 10cm with a heel, July/August in a frame[200]. Root cuttings 4cm long taken in December and potted up vertically in a greenhouse. Good percentage[78, 200]. Suckers in late autumn to winter[200].

nwatta Landscape Uses:Border, Erosion control, Foundation, Ground cover, Massing, Seashore, Woodland garden. Succeeds in a well-drained fertile soil in full sun[11, 200]. Tolerates poor soils[169, 200]. Established plants are drought resistant[169]. A very hardy plant when fully dormant, tolerating temperatures down to about -25°C[184]. However, the young growth in spring can be damaged by late frosts. Many of the species in this genus are highly toxic and can also cause severe irritation to the skin of some people, whilst other species such as this one are not poisonous. It is relatively simple to distinguish which is which, the poisonous species have axillary panicles and smooth fruits whilst non-poisonous species have compound terminal panicles and fruits covered with acid crimson hairs[1, 4]. The toxic species are sometimes separated into their own genus, Toxicodendron, by some botanists[200]. This species is a low suckering shrub[182]. There is a specially low growing form, var. arenaria, that is found growing on sand dunes in the mid-west of N. America[184]. A polymorphic species[43]. Plants are susceptible to coral spot fungus[11]. Plants have brittle branches that are easily damaged in very strong winds[11]. Plants in this genus are notably resistant to honey fungus[200]. This species transplants easily[169]. The plant has an offensive smell[149]. Or, to go by another nose, the bruised leaves emit a delicious resinous scent[245]. Dioecious. Male and female plants must be grown if seed is required. Special Features:Attracts birds, North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat

Zones range from 1 (no heat days) to 12 (120 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A clumping plant, forming a colony from shoots away from the crown but with a limited spread [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.44 Secale cereale

Rye, Cereal rye

3 tlin 7 cyuc 4 ckak 3 tcan 1 dwat 1.8 m hkuc
htut cyutli hgattcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta Secale cereale is a ANNUAL growing to 1.8 m (6ft) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to July, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

ckaakta Edible Parts: Oil Seed/Edible Uses: Coffee Oil SweetenerSeed - cooked[2, 13, 34, 46]. A common cereal, it is used especially in N. Europe to make bread[183]. The seed contains about 13% protein[61]. The grain also contains some gluten, though not as much as wheat, so it makes a heavier bread than wheat. It can also be used to make cakes etc. The seed can be sprouted and added to salads[183]. A nutritional analysis is available[218]. Malt, a sweet substance produced by germinating the seed, is extracted from the roasted germinated seed and used as a sweetening agent and in making beer etc[13]. The roasted (ungerminated) seed is used as a coffee substitute[46, 183].

cañta Biomass Green manure Oil Soil stabilization ThatchingThe straw is used as a fuel or as a biomass in industry[141]. It is quite strong[100] and can also be used in thatching, for paper making, weaving mats and hats etc[13, 34, 46, 61, 171]. Other uses for the straw include as a packing material for nursery stock, bricks and tiles, for bedding, archery targets, and mushroom compost[269]. The plant is a good green manure crop. It is fast growing with an extensive and deep root system[46]. It is especially useful if sown in late autumn. Its growth over the winter will prevent soil erosion and the leaching of nutrients from the soil, it can then be incorporated into the soil in the spring[171]. The extensive root system also makes this a good plant to use for soil stabilization, especially on sandy soils[171].

dwatta Cancer Laxative PoulticeThe seed is made into a poultice and applied to tumours[218]. The seed is also an effective laxative due to its fibrous seed coat[269].

nrakta W. Asia? Original habitat is obscure. ksacta Not known in a truly wild situation.

propta Seed - sow March or October in situ and only just cover the seed. Germination should take place within 2 weeks.

nwatta An easily grown plant, it succeeds in most soils but prefers a well-drained light soil in a sunny position[1, 132]. It thrives on infertile, submarginal areas and is renowned for its ability to grow on sandy soils[269]. Established plants are drought tolerant[1]. The plant is reported to tolerate an annual precipitation in the range of 22 to 176cm, an annual temperature in the range of 4.3 to 21.3°C and a pH of 4.5 to 8.2[269]. Rye is a widely cultivated temperate zone cereal crop. It is able to withstand severe climatic conditions and can be grown much further north and at higher altitudes than wheat[13, 34, 57]. Average yields vary widely from country to country, the world average is around 1.6 tonnes per hectare with yields of almost 7 tonnes per hectare achieved in Norway[269]. There are many named varieties[183]. Rye is a rather variable species and botanists have divided it into a number of sub-species, all of which could be of value in breeding programmes. These sub-species are briefly listed below:- S. cereale afghanicum

(K.Hammer. Native to the Caucasus, western Asia and India. *S. cereale ancestrale* Zhuk. Native to western Asia. *S. cereale dighoricum* Vavilov. Native to the Caucasus and eastern Europe. *S. cereale segetale* Zhuk. Native to temperate Asia. Rye grows well with cornflowers and pansies[18, 20], though it inhibits the growth of poppies and couch grass[18, 20]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fibrous dividing into a large number of fine roots [2-1].

4.2.45 *Gaultheria procumbens*

Checkerberry, Eastern teaberry, Teaberry, Creeping Wintergreen

3 tlin 6 cyuc 4 kcaak 4 tcan 3 dwat 0.2 m hkuc
pcimhmim cyutli hgatkycuctpr hwicli hyishrasjlut hpa7tli
frusflatruk hpa7tmwatli fyifxre7t hjonli

fruit Gaultheria procumbens is an evergreen Shrub growing to 0.2 m (0ft 8in) by 1 m (3ft 3in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in leaf all year, in flower from July to August, and the seeds ripen from October to December. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers dry or moist soil and can tolerate drought.

pcista The pure distilled essential oil is toxic in large doses[222]. If used orally may aggravate stomach ulcers. Do not use if allergic to aspirin. Avoid if under 12. Topical use can cause contact dermatitis [301].

kcakta Edible Parts: Fruit Leaves Edible Uses: Condiment TeaFruit - raw or cooked[2, 3, 14, 95, 101]. Pleasant but insipid[11]. The fruit is not at all insipid, it has a very strong spicy taste of germolene, just like being in a hospital waiting room[K]. Best after a frost, the fruit hangs onto the plant until spring if it is not eaten by birds etc[62, K]. The fruits can also be used in pies, or made into jams etc[183]. The fruit is up to 15mm in diameter[200]. Young leaves - raw[62, 102, 106]. A pleasant wayside nibble if used when very young[183]. Dry and powdery according to our taste buds[K]. A very agreeable tea is made from the fresh leaves[3, 95, 183]. A stronger tea can be made by first fermenting the bright red leaves[183]. 'Oil of wintergreen' can be distilled from this plant. It is used to flavour beer, sweets, chewing gum etc[183].

tcanta Essential An essential oil is obtained from the leaves by steam distillation[2, 14, 57, 213]. In order to obtain the oil, the leaves need to be steeped for 12 - 24 hours in water[4]. The essential oil is used as a food flavouring, medicinally (the original source of Wintergreen oil used as a liniment for aching muscles) and in perfumery and toothpastes. In large doses it can be toxic[165, 244]. A good ground-cover plant for shady positions though it requires weeding for the first year or so[28, 31, 197]. Forming a dense tuft-like carpet, it roots as it spreads and should be spaced about 45cm apart each way[208]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Analgesic Antiinflammatory Antirheumatic Aromatic Astringent Carminative Diuretic Emmenagogue Stimulant TonicCheckerberry leaves were widely used by the native North American Indians in the treatment of aches and pains and to help breathing whilst hunting or carrying heavy loads[238]. An essential oil (known as 'oil of wintergreen') obtained from the leaves contains methyl salicylate, which is closely related to aspirin and is an effective anti-inflammatory[213]. This species was at one time a major source of methyl salicylate, though this is now mainly synthesized[238]. The leaves, and the oil, are analgesic, anti-inflammatory, aromatic, astringent, carminative, diuretic,

emmenagogue, stimulant and tonic[4, 21, 165]. An infusion of the leaves is used to relieve flatulence and colic[254]. The plant, especially in the form of the essential oil, is most useful when applied externally in the treatment of acute cases of rheumatism, sciatica, myalgia, sprains, neuralgia and catarrh[4, 238]. The oil is sometimes used in the treatment of cellulitis, a bacterial infection that causes the skin to become inflamed[254]. Some caution is advised, especially if the oil is used internally, since essential oil is toxic in excess, causing liver and kidney damage[4, 238]. It should not be prescribed for patients who are hypersensitive to salicylates (aspirin)[238]. The leaves can be gathered at any time from spring to early autumn, they are dried for use in infusions or distilled to produce the oil[238].

nrakta Eastern N. America. Introduced and established on one site in Britain, in Scotland. ksacta Sterile woods (poor acid soils) and clearings[43, 62]. Especially found beneath evergreen trees[213].

propta The seed requires a period of cold stratification. Pre-chill for 4 - 10 weeks and then surface sow in a lime-free compost in a shady part of the greenhouse and keep the compost moist[78]. The seed usually germinates well, usually within 1 - 2 months at 20°C, but the seedlings are liable to damp off. It is important to water them with care and to ensure that they get plenty of ventilation. Watering them with a garlic infusion can also help to prevent damping off[K]. Prick out the seedlings into individual pots when they are about 25mm tall and grow them on in light shade in the greenhouse for at least their first winter[K]. Plant them out in late spring or early summer. The seedlings are susceptible to spring frosts so might need some protection for their first few years outdoors. The leaves remain very small for the first few years[11]. Cuttings of half-ripe wood 3 - 6cm long, July/August in a frame in a shady position. They form roots in late summer or spring[78]. A good percentage usually take. Division can be carried out at almost any time of the year, but works best in the spring just before new growth begins[K]. Very easy, larger clumps can be replanted directly into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Landscape Uses:Ground cover, Massing, Rock garden, Woodland garden. Prefers a moist but not boggy, humus rich soil in shade or semi-shade[11, 182]. A peat and moisture loving species, it requires a lime-free soil[11, 182]. Succeeds in dry soils once it is well established and tolerates considerable drought[208]. Grows well under the thin shade of deciduous shrubs or evergreens[4, 11]. A very cold-hardy plant, tolerating temperatures down to about -35°C[160]. Plants can become invasive when growing in good conditions[182]. Some named forms have been developed for their ornamental value. 'Dart's Red Giant' has specially large berries[182]. All parts of the plant are aromatic, the bruised leaves having the scent of wintergreen[245]. Plants in this genus are notably resistant to honey fungus[200]. Special Features: North American native, Fragrant foliage, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. A clumping mat former. Forming a dense prostrate carpet spreading indefinitely [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

4.2.46 *Mentha x piperita vulgaris*

Black Peppermint

3 tlin 7 cyuc 4 kcaak 3 tcan 5 dwat 0.5 m hkuc

prikhm-wis hpa7tmwatli xre7t hjonli

drutta *Mentha x piperita vulgaris* is a PERENNIAL growing to 0.5 m (1ft 8in) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista In large quantities this plant, especially in the form of the extracted essential oil, can cause abortions so should not be used by pregnant women.

kcakta Edible Parts: Leaves Edible Uses: Condiment Tea Leaves - raw or cooked. A strong peppermint flavour, they are used as a flavouring in salads or cooked foods[2, 27, 105]. This plant should not be used by pregnant women, see the notes above on toxicity. An essential oil from the leaves and flowers is used as a flavouring in sweets, chewing gum, ice cream etc[183]. A herb tea is made from the fresh or dried leaves[21, 183].

tcanta Essential Repellent Strewing An essential oil is obtained from the whole plant. It is used medicinally and as a food flavouring[2, 46, 57]. It is also an ingredient of oral hygiene preparations, toiletries etc[238]. Peppermint leaves are used as an ingredient of pot-pourri[238]. They were formerly used as a strewing herb[14]. The plant repels insects, rats etc[14, 18, 20]. Rats and mice intensely dislike the smell of mint. The plant was therefore used in homes as a strewing herb and has also been spread in granaries to keep the rodents off the grain[244]. Dynamic accumulator.

dwatta Abortifacient Anodyne Antiseptic Antispasmodic Aromatherapy Carminative Chologogue Diaphoretic Refrigerant Stomachic Tonic Vasodilator Black peppermint is a very important and commonly used herbal remedy, being employed by allopathic doctors as well as herbalists[9]. It is also widely used as a domestic remedy. This cultivar is considered to be stronger acting than white peppermint (*Mentha x piperita officinalis*). A tea made from the leaves has traditionally been used in the treatment of fevers, headaches, digestive disorders (especially flatulence) and various minor ailments[222, 238]. The herb is abortifacient, anodyne, antiseptic, antispasmodic, carminative, chologogue, diaphoretic, refrigerant, stomachic, tonic and vasodilator[4, 9, 21, 165, 238]. An infusion is used in the treatment of irritable bowel syndrome, digestive problems, spastic colon etc[254]. Externally a lotion is applied to the skin to relieve pain and reduce sensitivity[254]. The leaves and stems can be used fresh or dried, they are harvested for drying in August as the flowers start to open[4]. The essential oil in the leaves is antiseptic and strongly antibacterial, though it is toxic in large doses[222, 254]. When diluted it can be used as an inhalant and chest rub for respiratory infections[254]. The essential oil is used in aromatherapy. Its keyword is 'Cooling'[210].

nrakta Britain. ksacta A natural hybrid, *M. aquatica* x *M. spicata*, found in moist soils in ditches, waste places etc[9].

propta Seed - sow spring in a cold frame. Germination is usually fairly quick. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. *Mentha* species are very prone to hybridisation and so the seed cannot be relied on to breed true. Even without hybridisation, seedlings will not be uniform and so the content of medicinal oils etc will vary. When growing plants with a particular aroma it is best to propagate them by division[K]. Division can be easily carried out at almost any time of the year, though it is probably best done in the spring or autumn to allow the plant to establish more quickly. Virtually any part of the root is capable of growing into a new plant. Larger divisions can be planted out direct into their permanent positions. However, for maximum increase it is possible to divide the roots up into sections no more than 3cm long and pot these up in light shade in a cold frame. They will quickly become established and can be planted out in the summer.

nwatta Succeeds in most soils and situations so long as the soil is not too dry[1, 200]. Grows well in heavy clay soils. A sunny position is best for the production of essential oils, but plants also succeed in partial shade. Prefers a slightly acid soil[16]. A commonly grown herb[4], it is often cultivated commercially for its essential oil[61]. This is the black

form of peppermint and it is said to produce a superior essential oil, making it the preferred choice as a food flavouring and for medicinal purposes. The oil is of better quality when the plant is grown on dry soils[115]. Most mints have fairly aggressive spreading roots and, unless you have the space to let them roam, they need to be restrained by some means such as planting them in containers that are buried in the soil[K]. Hybridizes freely with other members of this genus. The flowers are very attractive to bees and butterflies[24]. A good companion for growing near cabbages and tomatoes, helping to keep them free of insect pests[20]. Members of this genus are rarely if ever troubled by browsing deer[233].

4.2.47 *Mentha spicata*

Spearmint

3 tlin 9 cyuc 4 kcak 3 tcan 3 dwat 0.6 m hkuc hmimhtut cyutli tcup hwicli hrsajlutnykfrif hpa7tli flatprikh-wis hpa7tmwatli xre7t hjonli

drutta *Mentha spicata* is a PERENNIAL growing to 0.6 m (2ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from August to September, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no records of toxicity have been seen for this species, large quantities of some members of this genus, especially when taken in the form of the extracted essential oil, can cause abortions so some caution is advised.

kcakta Edible Parts: Leaves Edible Uses: Condiment Tea Leaves - raw or cooked. A strong spearmint flavour, they are used as a flavouring in salads or cooked foods[2, 4, 5, 183]. The leaves are often used in 'mint sauce', which is used as a flavouring in meals[238]. A herb tea is made from the fresh or dried leaves[21, 183]. It has a very pleasant and refreshing taste of spearmint, leaving the mouth and digestive system feeling clean[K]. An essential oil from the leaves and flowers is used as a flavouring in sweets, ice cream, drinks etc[46, 57, 183]. A spearmint flavour[183].

tcanta Essential Repellent Strewing An essential oil is obtained from the whole plant, the yield is about 4K of oil from 1 tonne of leaves[46, 57]. The oil is used commercially as a food flavouring and oral hygiene preparation[238]. The plant repels insects and was formerly used as an strewing herb[14, 18, 20]. Rats and mice intensely dislike the smell of mint. The plant was therefore used in homes as a strewing herb and has also been spread in granaries to keep the rodents off the grain[244].

dwatta Antiemetic Antiseptic Antispasmodic Cancer Carminative Diuretic Poulitice Restorative Stimulant Stomachic Spearmint is a commonly used domestic herbal remedy. A tea made from the leaves has traditionally been used in the treatment of fevers, headaches, digestive disorders and various minor ailments[222]. The herb is antiemetic, antispasmodic, carminative, diuretic, restorative, stimulant and stomachic[4, 21, 46, 218]. The leaves should be harvested when the plant is just coming into flower, and can be dried for later use[4]. The stems are macerated and used as a poultice on bruises[218]. The essential oil in the leaves is antiseptic, though it is toxic in large doses[222]. Both the essential oil and the stems are used in folk remedies for cancer[218]. A poultice prepared from the leaves is said to remedy tumours[218].

nrakta C. Europe. Naturalized in Britain. ksacta Road-sides and waste places, usually in damp soils and sunny positions[4, 16, 17, 37].

propta Seed - sow spring in a cold frame. Germination is usually fairly quick. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. *Mentha* species are very prone to hybridisation and so the seed cannot be relied on to breed true. Even without hybridisation, seedlings will not be uniform and so the content of medicinal oils etc will vary. When growing plants with a particular aroma it is best to propagate them by division[K]. Division can be easily carried out at almost any time of the year, though it is probably best done in the spring

or autumn to allow the plant to establish more quickly. Virtually any part of the root is capable of growing into a new plant. Larger divisions can be planted out direct into their permanent positions. However, for maximum increase it is possible to divide the roots up into sections no more than 3cm long and pot these up in light shade in a cold frame. They will quickly become established and can be planted out in the summer.

nwatta A very easily grown plant, it succeeds in most soils and situations so long as the soil is not too dry[200]. Grows well in heavy clay soils. A sunny position is best for production of essential oils, but it also succeeds in partial shade[4]. Prefers partial shade and a slightly acid soil[4, 16]. Often grown as a culinary herb in the herb garden, spearmint is also commercially cultivated for its essential oil, the yields are about 3.5 to 4.5 kilos per tonne of leaves. There are some named varieties[200, 238]. Most mints have fairly aggressive spreading roots and, unless you have the space to let them roam, they need to be restrained by some means such as planting them in containers that are buried in the soil[K]. Hybridizes freely with other members of this genus. The whole plant has a strong spearmint smell. The flowers are very attractive to bees and butterflies[24]. A good companion plant for growing near cabbages and tomatoes, helping to keep them free of insect pests[14, 20]. Members of this genus are rarely if ever troubled by browsing deer[233]. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2]. Can be grown in containers.

4.2.48 *Erythronium americanum*

Trout Lily, Dogtooth violet
3 tlin 7 cyuc 4 kcaak 3 tcan 1 dwat 0.2 m hkuc
hmim cyutli tcup hwicli hrasjlut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Erythronium americanum* is a BULB growing to 0.2 m (0ft 8in) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from March to April, and the seeds ripen from May to June. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland). It prefers moist soil.

pcista Although no records of toxicity have been seen for this species, the following notes have been seen for another member of this genus and so some caution is advised. Skin contact with the bulbs has been known to cause dermatitis in sensitive people[65].

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Bulb - raw[106] or cooked[105, 177]. A crisp, chewy and very pleasant taste[183]. The bulb is up to 25mm long and is buried quite deeply in the soil[4]. Leaves - raw or cooked[105, 177]. Added to salads[183]. Eating the leaves will greatly reduce the vigour of the bulb, so can only be recommended in times of emergency[K]. Flowers, flower buds and flower stems - raw or cooked[183].

tcanta Plants spread freely by means of underground stems and make a delightful ground cover in dappled shade[257]. The plants are only in growth from late winter to late spring so the ground cover effect is ephemeral[K].

dwatta Antiscrophulatic Contraceptive Emetic Emollient Poultice All parts of the plant, but especially the bulb and the fresh leaves, are strongly emetic and are not used

internally[4]. The fresh leaves are also antiscrophulatic and emollient and are used as an infusion or stimulating poultice applied to swellings, tumours and scrofulous ulcers[4, 106, 254]. The juice from crushed leaves has been applied to wounds that are not healing[257]. A poultice of the crushed bulbs has been applied to swellings and to help remove splinters[257]. The raw plant, excluding the roots, has been used by native North American young girls to prevent conception[257].

nrakta Eastern N. America - New Brunswick to Florida, west to Ontario and Arkansas. ksacta Meadows and rich damp open woodland[4, 43].

propta Seed - best sown as soon as it is ripe in a shady position in a cold frame. Water lightly in summer, it should germinate in autumn or winter[164, 200]. Stored seed requires a period of cold stratification[164]. Sow as early in spring as possible in a cold frame. Sow the seed thinly so that it will not be necessary to prick them out for their first year of growth. Give an occasional liquid feed to the seedlings to make sure that they do not become nutrient deficient. When the plants are dormant, pot up the small bulbs putting 2 - 3 bulbs in each pot. Grow them on in a shady position in the greenhouse for another 2 3 years and then plant them out into their permanent positions when they are dormant in late summer. Division in summer as the leaves die down. This species does not produce offsets[200].

nwatta Prefers slightly acid soil conditions but succeeds in chalky soils if these contain plenty of humus[164]. Requires semi-shade, preferably provided by trees or shrubs, and a well-drained soil[42, 164]. Succeeds in almost any light soil, preferring one that is rich in humus[1]. Nonflowering plants far outnumber flowering ones in most populations because of their extensive stolon production[270]. This species does not flower very freely, increasing mainly by its stoloniferous habit[164]. The flowers only open in warm sun[90]. When established in woodland, this species can spread very freely by means of underground roots[258]. Flowers are produced in 3 - 4 years from seed[164]. The plant is heat tolerant in zones 9 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2]. The root pattern is a corm swelling at the stem base [1-2].

4.2.49 *Medeola virginiana*

Indian Cucumber Root
3 tlin 7 cyuc 4 kcaak 1 tcan 1 dwat 0.3 m hkuc
hmim cyutli tcup hwicli hrasjlut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Medeola virginiana* is a PERENNIAL growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: Root Edible Uses: Root - raw or cooked[55, 62]. Crisp and tender with the aroma and taste of cucumbers[1, 2, 102, 183]. A sweet flavour[159]. The root is up to 8cm long[200].

tcanta Scented plant.

dwatta Antispasmodic Diuretic Hydrogogue The root is diuretic and hydrogogue[4]. It is used in the treatment of dropsy[4]. An infusion of the crushed dried berries and leaves has been used to treat babies with convulsions[257].

nrakta Eastern N. America - Nova Scotia to Ontario, Minnesota, Florida and Tennessee. ksacta Rich woods[43], margins of swamps and bogs[62].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame in a well-drained soil-less medium[200]. Fully remove the fleshy seed covering because this contains germination inhibitors. The seed should germinate in the spring[K]. Spring sown seed can be slow to germinate and may take 12 months or more[K]. The seed should be sown thinly so that the seedlings can be grown on undisturbed in the pot for their first year. If necessary apply a liquid feed at intervals through the growing season to ensure that the plants grow on well. Prick the roots out into individual pots in the autumn and grow them on in a shady part of the greenhouse for at least the next growing season, planting them out into their permanent positions when they are dormant. Division in spring as the plant comes into growth[1].

nwatta Prefers light shade and plenty of leaf mould in a slightly acid soil[200]. Prefers a rich sandy soil[1]. The rootstock has a pleasant refreshing smell of cucumber[245]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.50 Smilacina stellata

Star-Flowered Lily Of The Valley

3 tlin 7 cyuc 4 kcaak 0 tcan 2 dwat 0.6 m hkuc
pcimhmim cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli xre7t hjonli

drutta Smilacina stellata is a PERENNIAL growing to 0.6 m (2ft) by 0.6 m (2ft in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to June, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Fruit - raw or cooked[105, 161]. The fruit is about the size of a pea and is produced on the plant in small terminal clusters of about 2 - 8 berries[256]. It has a nice bitter-sweet flavour that is somewhat reminiscent of treacle[85, K]. The fruit is a good source of vitamin C, it has been used to prevent scurvy[213]. The fruit is said to be laxative in large quantities when eaten raw, especially if you are not used to eating it, though thorough cooking removes this laxative effect[K]. Young leaves - raw or cooked. The young shoots, as they emerge in spring, can be used as an asparagus substitute[85]. The young shoots and leaves are cooked and used as greens[212]. Root - cooked. It should be soaked in alkaline water first to get rid of a disagreeable taste[85, 213]. It can be eaten like potatoes[213].

tcanta Plants can be grown as a ground cover when planted about 60cm apart each way[208]. An inferior cover to *S. racemosa*[208].

dwatta Vitamin CStar-flowered lily of the valley was employed medicinally by several native North American Indian tribes who used it to treat a variety of complaints[257]. It is little, if at all, used in modern herbalism. A tea made from the roots is drunk to regulate menstrual disorders[213]. A decoction of the leaves is taken 2 - 3 times a day in the treatment of rheumatism and colds[257]. Half a cup of leaf tea drunk daily for a week by a woman is said to prevent conception[213, 257]. The root is analgesic, antiseptic, haemostatic, ophthalmic, stomachic and vulnerary[257]. An infusion has been used in the treatment of stomach complaints, internal pains and to regulate menstrual disorders[257]. The dried powdered root has been used in treating wounds and bleeding[213, 257]. The crushed root has been used as a poultice on sprains, boils, swellings and limbs affected by rheumatism[257]. The pulped root has been used as ear drops to treat ear aches[257]. An infusion of the roots has been used as a wash for inflamed eyes[257].

nrakta N. America - British Columbia to California and east to Virginia and Newfoundland. ksacta Woods, thickets

and open meadows, on gravelly and alluvial soils[43, 85]. Sand dunes, marginal woodlands, oak openings from sea level to 3200 metres[270].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be very slow to germinate, often taking 18 months. Stored seed should be sown in a cold frame as soon as possible, it may take 2 years or longer to germinate. Grow the seedlings on in a shady part of a greenhouse for their first year without pricking them out, giving them liquid or foliar feeds as required to ensure that they do not become nutrient deficient. Divide the young plants up into individual pots in the autumn when they are dormant, and grow them on for at least another year in a shady part of the greenhouse. When the plants have reached a sufficient size, plant them out in the autumn whilst they are dormant. Division in spring or early autumn. Very easy, larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta Requires a deep fertile humus rich moisture retentive soil, neutral to slightly acid, that does not dry out in the growing season, and a shady position[200]. Does well in a woodland garden[200]. Plants have a creeping rhizome and can form extensive patches[187]. Fruits well in a shady woodland position at Kew[K]. Hardy to about -25°C[187]. Plants are slow to establish but then can become invasive[208]. The flowers are powerfully scented[245].

4.2.51 Brassica oleracea botrytis

Cauliflower

3 tlin 10 cyuc 4 kcaak 3 tcan 0 dwat 0.8 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrik hpa7tli flatprik-
wis hpa7tmwatli fyfibre7t hjonli

drutta Brassica oleracea botrytis is a BIENNIAL growing to 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

kcakta Edible Parts: Flowers LeavesEdible Uses: Immature flowering head - raw or cooked[1, 16, 37, 46]. A mild cabbage-like flavour, they make an excellent cooked vegetable and are also very acceptable in salads[K]. By careful selection of cultivars, it is possible to produce flowering heads all year round[K]. Leaves - cooked[37]. A mild cabbage flavour, they make a good cooked vegetable[K]. Do not over-harvest them, however, since this would adversely affect the production of the flowering head[K].

tcanta Companion FungicideAn extract of the seeds inactivates the bacteria that causes black rot[20, 201]. Grows well with celery and other aromatic plants since these seem to deter insect predations[18, 20, 201]. Grows badly with beet, tomatoes, onions and strawberries[20, 201].

nrakta A cultivated form of *B. oleracea*. ksacta Not known in the wild.

propta Seed - sow in a seedbed outdoors in April to June depending on the cultivar. Plant out into their permanent position when the plants are 5 - 10cm tall. Seed of some cultivars can be sown in late winter in a greenhouse in order to obtain a harvest in early summer. Do not let the seedlings get overcrowded or they will soon become leggy and will not make such good plants. If your seedlings do get leggy, it is possible to plant them rather deeper into the soil - the buried stems will soon form roots and the plant will be better supported.

nwatta Succeeds in full sun in a well-drained moisture-retentive fertile soil with plenty of lime[37, 200, 264]. Cauliflowers, especially the winter and spring maturing types, should not be given a soil that is too rich in nitrogen since this can encourage soft, sappy growth that is more susceptible to winter cold damage[264]. Prefers a heavy soil[16]. Requires a warm sunny position[16]. Prefers a pH in the range 6 to 7[200], though it tolerates a pH in the range

4.3 to 8.3. Succeds in maritime gardens[200]. Lack of moisture in the growing season can cause the plant to produce small or deformed curds[264]. Summer varieties are not very cold hardy and will be damaged by light frosts, winter cauliflower plants are more hardy and will tolerate temperatures down to about -6°C, though the curds are more sensitive and can suffer damage at about -2°C[200]. This damage can often be prevented by bending over the leaves so that they cover the curd. Cauliflowers are widely grown for their edible immature flower heads (or curd). There are many named varieties and, by careful selection, it is possible to provide a year round supply. The summer and autumn maturing cultivars are annuals, they need to produce a certain number of leaves before curd development will be initiated. The optimum temperature for this is around 17°C, but at temperatures above 20°C the curds will either be of poor quality or not be produced at all[200]. Winter and spring maturing forms are biennial and need exposure to temperatures below 10°C before they will produce curds and once again, this will not happen unless the plant has reached a certain size[200]. Grows well with celery and other aromatic plants since these seem to deter insect predations[18, 20, 201]. Grows badly with beet, tomatoes, onions and strawberries[20, 201].

4.2.52 *Claytonia sibirica*

Pink Purslane, Siberian springbeauty
3 tlin 7 cyuc 4 kcaak 3 tcan 1 dwat 0.2 m hkuc
pcimhmimhtuc cyutli kyuctcup hwicli hyishrasjlutnyik hpa7tli
frusflmatprikwls hpa7tmwatli fyfxhre7t hjonli

drutta *Claytonia sibirica* is an evergreen Annual/Perennial growing to 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in leaf all year, in flower from April to July, and the seeds ripen from June to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers dry or moist soil.

ksakta Edible Parts: Leaves Edible Uses: Leaves - raw or cooked[2, 62, 183]. They usually have a fairly bland flavour and are quite nice in a salad or cooked as a green vegetable. The leaves have a distinct earthy after-taste rather like raw beetroot[K]. They are available all year round but can turn rather bitter in the summer, especially if the plant is growing in a hot dry position[K]. Although on the small side, the leaves are produced in abundance and are very easily harvested[K].

tcanta A good ground cover plant for a shady position[208]. This species is a short-lived perennial but it usually self-sows freely and gives a dense weed-excluding ground cover[K].

dwatta Antidandruff Diuretic Ophthalmic Poultice The plant is diuretic[257]. A poultice of the chewed leaves has been applied to cuts and sores[257]. The juice of the plant has been used as eye drops for sore red eyes[257]. A cold infusion of the stems has been used as an antidandruff wash for the hair[257].

nrakta E. Asia - Siberia. Western N. America - Alaska to California. Naturalized in Britain. ksakta Damp woods, shaded streamsides etc, especially on sandy acid soils[17, 150]. Thickets of red alder, dogwood, vine-leaf maple, moist shaded coniferous forests from sea level to 2000 metres[270].

propta Seed - sow spring or autumn in situ. The seed usually germinates rapidly.

nwatta A very tolerant and easily grown plant, it prefers a moist peaty soil[1] and is unhappy in dry situations[K]. It succeeds in full sun[200] though is happier when given some shade and also grows in the dense shade of beech trees[88]. Plants usually self-sow freely[200, K]. This is an excellent and trouble-free salad plant. It is extremely cold-hardy and can provide edible leaves all year round in all areas of the country even if it is not given protection[K]. *Montia sibirica* (L.) Howell is a synonym of *Claytonia sibirica* L. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit

and root pattern is also useful and given here if available. A clumping mat former. Forming a dense prostrate carpet spreading indefinitely [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

4.2.53 *Portulaca oleracea*

Green Purslane, Little hogweed
3 tlin 12 cyuc 4 kcaak 2 tcan 3 dwat 0.3 m hkuc
htut cyutli tcup hwicli hrasjlut hpa7tli flatprikwls
hpa7tmwatli fyfxhre7t hjonli

drutta *Portulaca oleracea* is a ANNUAL growing to 0.3 m (1ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is frost tender. It is in flower from June to September, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

ksakta Edible Parts: Leaves Seed Edible Uses: Salt Leaves and stems - raw or cooked[1, 4, 12, 27, 37]. The young leaves are a very acceptable addition to salads, their mucilaginous quality also making them a good substitute for okra as a thickener in soups[4, 183]. Older leaves are used as a potherb[4]. The leaves have a somewhat sour flavour[85]. A spicy and somewhat salty taste[9]. The leaves are a source of omega-3 fatty acids, though seed sources such as walnuts are magnitudes richer[222]. The leaves can be dried for later use[85]. They contain about 1.8% protein, 0.5% fat, 6.5% carbohydrate, 2.2% ash[179]. Another analysis gives the following figures per 100g ZMB. 245 - 296 calories, 17.6 - 34.5g protein, 2.4 - 5.3g fat, 35.5 - 63.2g carbohydrate, 8.5 - 14.6g fibre, 15.9 - 24.7g ash, 898 - 2078mg calcium, 320 - 774mg phosphorus, 11.2 - 46.7mg iron, 55mg sodium, 505 - 3120mg potassium, 10560 - 20000ug B-carotene equivalent, 0.23 - 0.48mg thiamine, 1.12 - 1.6mg riboflavin, 5.58 - 6.72mg niacin and 168 - 333mg ascorbic acid[218]. Seed - raw or cooked[62, 102, 159]. The seed can be ground into a powder and mixed with cereals for use in breads, bread, pancakes etc[183, 193]. The seed is rather small and fiddly to utilize[85]. In arid areas of Australia the plants grow quite large and can produce 10, 000 seeds per plant, a person can harvest several pounds of seed in a day. The seeding plants are uprooted and placed in a pile on sheets or something similar, in a few days the seeds are shed and can be collected from the sheet[193]. In Britain, however, yields are likely to be very low, especially in cool or wet summers[K]. The seed contains (per 100g ZMB) 21g protein, 18.9g fat, 3.4g ash[218]. Fatty acids of the seeds are 10.9% palmitic, 3.7% stearic, 1.3% behenic, 28.7% oleic, 38.9% linoleic and 9.9% linolenic[218]. The ash of burnt plants is used as a salt substitute[183].

dwatta Antiscorbutic Depurative Diuretic Febrifuge Skin Tonic Vermifuge The plant is antibacterial, antiscorbutic, depurative, diuretic and febrifuge[4, 7, 147, 152, 238]. The leaves are a rich source of omega-3 fatty acids, which is thought to be important in preventing heart attacks and strengthening the immune system[238]. Seed sources such as walnuts, however, are much richer sources[222]. The fresh juice is used in the treatment of strangury, coughs, sores etc[4, 7, 147, 152]. The leaves are poulticed and applied to burns[222], both they and the plant juice are particularly effective in the treatment of skin diseases and insect stings[7, 238]. A tea made from the leaves is used in the treatment of stomach aches and headaches[222]. The leaf juice is applied to earaches, it is also said to alleviate caterpillar stings[222]. The leaves can be harvested at any time before the plant flowers, they are used fresh or dried[238]. This remedy is not given to pregnant women or to patients with digestive problems[238]. The seeds are tonic and vermifuge[218, 240]. They are prescribed for dyspepsia and opacities of the cornea[218].

nrakta S. Europe. A not infrequent casual in Britain. ksakta Fields, waste ground, roadside verges, cultivated ground and by the sea[7].

propta Seed - for an early crop, the seed is best sown under protection in early spring and can then be planted out in late spring[4]. Outdoor sowings in situ take place from late

ripening to late summer, successful sowings being made every two to three weeks if a constant supply of the leaves is required[4].

Carum Requires a moist light rich well-drained soil in a sunny position[4, 37, 200]. Plants will not produce good quality leaves when growing in dry conditions[4]. A perennial plant in warmer climates than Britain, purslane is killed by frost but can be grown as a half-hardy annual in this country[1]. It can become an aggressive weed in areas where the climate suits it[274]. The flowers only open in full sunlight[244]. Purslane is occasionally cultivated for its edible leaves, there are some named varieties[183]. The plants take about six to eight weeks to produce a crop from seed and can then be harvested on a cut and come again principle, providing edible leaves for most of the summer[4].

4.2.54 **Carum carvi**

Caraway

3 tlin 9 cyuc 4 kcaak 3 tcan 3 dwat 0.6 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli fyfxfre7t hjonli

drutta Carum carvi is a BIENNIAL growing to 0.6 m (2ft) by 0.3 m (1ft in). It is not frost tender. It is in flower from June to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Caraway is said to contain the alleged 'psychotroph' myristicine[218]. Excessive intake can lead to kidney and liver damage [301]

kcakta Edible Parts: Leaves Root Seed Edible Uses: Condiment Tea Seed - raw or cooked. A spicy flavour, it is used as a flavouring in confectionery and bread, also as a flavouring in salads, vegetables etc[2, 4, 5, 9, 18, 20, 27, 183]. It is high in protein and fat[14]. The seed is often chewed after a meal in order to sweeten the breath and also to relieve heartburn after a rich meal[244]. Per 100g, the seed contains 333 calories, 10g water, 20g protein, 14.5g fat, 50g carbohydrate, 12.5g fibre, 6g ash, 689mg calcium, 568mg phosphorus, 16.2mg iron, 258mg magnesium, 17mg sodium, 1351mg potassium, 5.5mg zinc, 363 IU vitamin A, 0.383mg thiamine, 0.379mg riboflavin, 3.61mg niacin[218]. An essential oil from the seed is used as a flavouring in ice creams, candy, soft drinks etc[183, 238]. It is an essential ingredient of the liqueur kummel[244]. Root - cooked[183]. Used as a vegetable like parsnips[2, 4, 9, 14, 55, 115]. Stronger in taste than parsnips, but liked by many[207]. A delicious vegetable[244]. Leaves - raw or as a flavouring in soups etc[2, 14, 27, 55, 115]. The young leaves are much less spicy than the seeds and are a good salad[9], having a mild parsley-dill flavour[238]. They give an aromatic tang to salads[244]. Older leaves can be cooked as a spinach[183]. The crushed seeds are brewed into a tea[183]. It has a soothing effect on the digestion[244].

tcanta Essential Parasiticide An essential oil from the seed is used in perfumery, for scenting soap, as a parasiticide etc[7, 46, 74, 171]. Twenty-five kilos of seed yield about 1 kilo of essential oil[4]. The essential oil yield of the seed from plants cultivated in Poland is up to 10.33%[240]. Caraway is also used as a breath freshener.

dwatta Antiseptic Antispasmodic Aromatic Carminative Digestive Emmenagogue Expectorant Galactagogue Ophthalmic Parasiticide Stimulant Caraway has a long history of use as a household remedy especially in the treatment of digestive complaints where its antispasmodic action soothes the digestive tract and its carminative action relieves bloating caused by wind and improves the appetite[4, 238, 254]. It is often added to laxative medicines to prevent griping[238]. The seed is antiseptic, antispasmodic, aromatic, carminative, digestive, emmenagogue, expectorant, galactagogue and stimulant[4, 7, 9, 21, 46, 165, 222, 240]. It can be chewed raw for the almost immediate relief of indigestion and can also be made into infusions[238]. The seed is also used in the treatment of bronchitis and are an ingredient of cough remedies, especially useful for children[254]. The seed is also said to increase the production of breast milk in nursing mothers[254]. The seed is harvested when fully

ripened, then dried and stored in a cool, dry place out of the sunlight[244]. The essential oil can be extracted from the seed and has similar properties[4]. A tea made from the seeds is a pleasant stomachic and carminative, it has been used to treat flatulent colic[207, 222]. The seed is used in Tibetan medicine where it is considered to have an acrid taste and a heating potency[241]. It is used to treat failing vision and loss of appetite[241]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve Carum carvi for dyspeptic complaints (see [302] for critics of commission E).

nrakta Europe. Rarely naturalized in Britain. Perhaps native in S.E. England[17]. ksacta Moist meadows, arable land and waste places from lowland to mountain elevations[9, 165, 244].

propta Seed - it is best sown in situ as soon as it is ripe in late summer and early autumn[4, 200]. The seed can also be sown March/April in situ[200], though in areas with cool summers the plants might not produce a crop of ripe seeds[238]. Plants are very sensitive to root disturbance and should not be transplanted.

nwatta Succeeds in ordinary garden soil as long as it is not too wet in winter[1]. Prefers a moist soil in full sun or partial shade[4, 200]. Tolerates a pH in the range 4.8 to 7.6. Caraway is a well-known herb that has been cultivated for its culinary and medicinal uses since ancient times[244]. It is frequently cultivated in the modern herb garden and sometimes also commercially[4, 46], there are some named varieties[183]. Plants growing in more northerly latitudes and also in full sun are richer in essential oils and therefore more aromatic[4, 245]. Plants strongly resent root disturbance[200]. They often self-sow freely when in a suitable location[244]. This species is deep rooted[201] and is a good plant for breaking up the sub-soil on heavy, wet land[18, 20]. It dislikes growing near fennel or wormwood[14, 20] but is a good companion for most plants, especially those that are shallow-rooted[201]. The flowers attract parasitic wasps to the garden, these prey on aphids and so help to reduce populations of insect pests[238].

4.2.55 **Dentaria diphylla**

Crinkleroot

3 tlin 8 cyuc 4 kcaak 0 tcan 2 dwat 0.3 m hkuc
pcimhmim cyutli tcup hwicli hrasljut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Dentaria diphylla is a PERENNIAL growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: Leaves Root Edible Uses: Root - raw or cooked[46, 61, 161]. It has a crisp texture and a pleasant pungent taste[43], rather like water cress or horseradish[183]. It can be added to salads or used as a relish[105, 183]. The root has a pungent acrid taste when first harvested, the Indians cleaned the roots, heaped them on a blanket, covered them to exclude air and then left them to ferment for 4 - 5 days. After this the roots developed a sweet taste[207]. Leaves - raw or cooked[257]. The cooking water was changed once in order to remove the bitterness[257].

dwatta Cardiac Carminative Febrifuge Miscellaneous Odontalgic Stomachic The peppery root is used as a folk remedy in the treatment of toothache[222]. It has also been chewed in the treatment of colds, an infusion drunk to treat gas and other stomach problems, and it has been made into a poultice for headaches[222, 257]. A tea made from the root is gargled in the treatment of sore throat, hoarseness etc[222, 257]. An infusion of the plant has been used to treat fevers in children[257]. Combined with Acorus calamus root, it has been used in the treatment of heart diseases[257].

nrakta Eastern N. America - Ontario to S. Carolina, Kentucky and Minnesota. ksacta Rich damp woods and meadows[43, 187].

propta Seed - sow spring in a cold frame. Germination usually takes place within 1 - 3 weeks at 15°C[175]. When

large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in a greenhouse or cold frame for the first two years, planting them out when dormant in late summer. Division in early spring or after the plant dies down in the summer. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta An easily grown plant, preferring a rich light moist soil and a shady position[1]. This species is hardy to about -20°C[187]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.56 *Streptopus roseus*

Scotberry, Rosybell

3 tlin 7 cyuc 4 kcaok 2 tcan 2 dwat 0.5 m hkuc
pcimhmim cyutli tcup hwicli hrasljut hpa7tli flatprikrlwis hpa7tmwatli xre7t hjonli

drutta *Streptopus roseus* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to July, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: Fruit Leaves Edible Uses: Young leaves and shoots are added to salads to impart a cucumber flavour[183]. They can also be cooked and used as greens[172, 257]. Fruit - raw or cooked. A sweetish flavour[207], though it is said to be cathartic if eaten in quantity[183, 207], especially if you have not eaten this fruit before[K]. A watermelon flavour[172]. The fruit is about 12mm in diameter[235].

dwatta Cathartic Diaphoretic Ophthalmic Pectoral Tonic Women's complaints The fruit is cathartic[172, 207]. An infusion of the roots has been used in the treatment of a fallen womb[257]. A cough syrup can be made from the root[257]. A poultice of the steeped root has been applied to the eyes in the treatment of sties[257]. The flowers are diaphoretic[257]. They can be used to induce sweating in the treatment of colds and fevers. The plant is tonic[257]. An infusion of the plant has been used in the treatment of coughs[257].

nrakta Eastern N. America - Newfoundland to Manitoba, south to Georgia and Michigan. ksacta Moist woods, river banks, alder thickets[172]. Damp montane woods, 9000 - 1800 metres[60].

propta Seed - best sown in a cold frame as soon as it is ripe in the summer[200]. Sow stored seed in a cold frame as soon as it is received. The seed, especially if it has been stored, can be very slow to germinate, sometimes taking 18 months or more. Prick out the seedlings into individual pots once they are large enough to handle and grow them on in a shady part of the greenhouse or cold frame. It will normally take 2 or more growing seasons before the roots are large enough to plant out - this is best done when the plant is dormant in the autumn. Division as the plant comes into growth in early spring. Larger divisions can be planted out direct into their permanent positions. We have found that it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame for their first year, planting them out in the following spring.

nwatta Requires a cool leafy soil in shade or partial shade[187]. Thrives in a moist light soil containing organic matter[1]. Hardy to at least -20°C. A very ornamental plant[1]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous

with underground stems sending roots and shoots along their length [1-2].

4.2.57 *Prunus pumila*

Dwarf American Cherry, Sandcherry, Western sandcherry, Eastern sandcherry, Great Lakes sandcherry
3 tlin 8 cyuc 4 kcaok 2 tcan 1 dwat 0.6 m hkuc
htut cyutli hgatyucuctup hwicli hrasljutnyk hpa7tli flatprikrlwis hpa7tmwatli fyfixre7t hjonli

drutta *Prunus pumila* is a deciduous Shrub growing to 0.6 m (2ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 2. It is in flower in May, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw or cooked[2, 159, 161]. A reasonable size, up to 10mm in diameter with one large seed[200], this is the largest of the N. American cherries[213]. A rich and pleasantly acid taste when fully ripe though they are sometimes slightly bitter[2, 11, 101, 183]. Eaten out of hand, used in preserves or dried for later use[183]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta Dye Rootstock A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Used as a rootstock for the sour cherry[160].

dwatta Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta Eastern N. America - New Brunswick to Manitoba, Maine, New Jersey, Indiana and Wisconsin. ksacta Dunes and sand, or on calcareous rocky shores[43].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Requires a well-drained moisture retentive soil[1, 11]. Thrives in a loamy soil, doing well on limestone[11]. Prefers some chalk in the soil but apt to become chlorotic if too much is present[1]. Requires a sunny position[11]. Established plants are very drought resistant[160]. This species is hardy to about -35°C when the plants are fully dormant[160], though the young growth in spring is fairly tender[K]. Plants are susceptible to mildew in low areas[160]. Plants thrive in areas with a short growing season[160]. The fruits are highly resistant to all fruit worms[160]. Plants can produce fruit in 3 years from seed[160]. A single plant, growing at Hilliers Arboretum in 1999, produced a good crop of fruit with viable seed, so the species is almost certainly self-fertile[K]. Most members of this genus are shallow-rooted and will produce suckers if the

roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2].

5 4 tlin

5.1 bwon

5.1.1 Apios fortunei

Hodo, Hodoimo
tfo2n 4 tlin 9 cyuc 5 kcaak 3 tcan 1 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli frusflatprikjwis
hpa7tmwatli xre7t hjonli

drutta Apios fortunei is a PERENNIAL. See above for USDA hardiness. It is hardy to UK zone 5. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: RootEdible Uses: Tuber - raw or cooked[105, 177]. It has a delicious flavour somewhat like sweet potatoes when roasted[179]. The tuber can also be dried and ground into a powder. The tuber contains about 4.2% protein, 0.2% fat, 18.3% starch, 6% other carbohydrate, 1.3% ash[179].

dwatta TonicThe root is tonic[218].

nrakta E. Asia - China, Japan. ksakta Woods and thickets, 600 - 1000 metres in W. China[109].

propta Seed - pre-soak for 3 hours in tepid water and sow February/March in a cold frame. The seed usually germinates in 1 - 3 months at 15°C[134]. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for their first winter, planting them out in late spring or early summer. Division can be carried out at almost any time of the year, though spring is probably the best time. Simply dig up the roots, harvest the tubers and replant them where you want the plants to grow. It is also possible to harvest the tuber in winter, store them in a cool fairly dry but frost-free place over the winter and then plant them out in the spring. The tubers lose moisture rapidly once they have been harvested, so make sure that you store them in a damp medium such as leafmold.

nwatta We have very little information on this species and do not know if it will be hardy in Britain, though judging by its native range it should succeed outdoors in many parts of this country. The following notes are based on the general needs of the genus. Prefers a light rich soil and a sunny position[1, 27]. Another report says that it prefers light dappled shade[200]. Tolerates acid soils[160]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Growth habit is a single or multiple shooting vine from a crown [1-2]. Herbaceous. The root pattern is tuberous with swollen potato-like roots [1-2].

5.1.2 Hippophae rhamnoides turkestanica

Sea Buckthorn
tfo2n 4 tlin 7 cyuc 5 kcaak 5 tcan 5 dwat 6 m hkuc
htut cyutli hgatyuctcuphja7n hwicli hyishrasjlutnyik hpa7tli
flatprikjwis hpa7tmwatli nyanhjen hjonli

drutta Hippophae rhamnoides turkestanica is a deciduous Shrub growing to 6 m (19ft) by 2.5 m (8ft) at a medium

rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in April, and the seeds ripen from September to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Wind. The plant is not self-fertile. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry moist or wet soil and can tolerate drought. The plant can tolerate maritime exposure.

pcista Some reports suggest that the fruit is poisonous[13, 100], whilst it may be very acid it is most definitely not poisonous[65]. Avoid during pregnancy.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked. Very rich in vitamin C (120mg per 100g)[74] and vitamin A[183], but too acid when raw for most peoples tastes[11, 158]. Used for making fruit juice, it is high in vitamins and has an attractive aroma[141]. It is being increasingly used in making fruit juices, especially when mixed with other fruits, because of its reputed health benefits[214]. The fruits of some species and cultivars (not specified) contain up to 9.2% oil[214]. The fruit is very freely borne along the stems[K] and is about 6 - 8mm in diameter[200]. The fruit becomes less acid after a frost or if cooked[74]. The fruit is ripe from late September and usually hangs on the plants all winter if not eaten by the birds. It is best used before any frosts since the taste and quality of frosted berries quickly deteriorates[214].

tcanta Charcoal Dye Fuel Soil stabilization WoodVery tolerant of maritime exposure[29, 49, 75, 182], it can be used as a shelter hedge. It dislikes much trimming[75]. A very thorny plant, it quickly makes an impenetrable barrier. Sea buckthorn has an extensive root system and suckers vigorously and so has been used in soil conservation schemes, especially on sandy soils. The fibrous and suckering root system acts to bind the sand[186, 244]. Because the plant grows quickly, even in very exposed conditions, and also adds nitrogen to the soil, it can be used as a pioneer species to help the re-establishment of woodland in difficult areas. Because the plant is very light-demanding it will eventually be out-competed by the woodland trees and so will not outstay its welcome[K]. The seeds contain 12 - 13% of a slow-drying oil[240]. The vitamin-rich fruit juice is used cosmetically in face-masks etc[9]. A yellow dye is obtained from the fruit[74]. A yellow dye is obtained from the stems, root and foliage[4]. A blackish-brown dye is obtained from the young leaves and shoots[74]. Wood - tough, hard, very durable, fine-grained. Used for fine carpentry, turning etc[46, 61, 74]. The wood is also used for fuel and charcoal[146].

dwatta Astringent Cancer Cardiac Eczema Poultry Tonic Vermifuge Vitamin CThe twigs and leaves contain 4 - 5% tannin[240]. They are astringent and vermifuge[7, 100]. The tender branches and leaves contain bio-active substances which are used to produce an oil that is quite distinct from the oil produced from the fruit. This oil is used as an ointment for treating burns[214]. A high-quality medicinal oil is made from the fruit and used in the treatment of cardiac disorders, it is also said to be particularly effective when applied to the skin to heal burns, eczema and radiation injury, and is taken internally in the treatment of stomach and intestinal diseases[214]. The fruit is used as a tonic[9]. The freshly-pressed juice is used in the treatment of colds, febrile conditions, exhaustion etc[9]. The fruit is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta E. Asia - Himalayas in the higher Tibetan plateau. ksakta Uper subalpine to lower alpine zones.

propta Seed - sow spring in a sunny position in a cold frame[78]. Germination is usually quick and good although 3 months cold stratification may improve the germination rate. Alternatively the seed can be sown in a cold frame as soon as it is ripe in the autumn. Prick out the seedlings into individual pots when they are large enough to handle and grow on in a greenhouse for their first winter. Plant out in late spring into their permanent positions. Male seedlings, in spring, have very prominent axillary buds whilst females are

clear and smooth at this time[28]. Cuttings of half-ripe wood, June/July in a frame[200]. Difficult[113]. This is the easiest method of vegetative propagation[214]. Cuttings of mature wood in autumn[200]. Difficult[113]. The cuttings should be taken at the end of autumn or very early in the spring before the buds burst. Store them in sand and peat until April, cut into 7 - 9cm lengths and plant them in a plastic tent with bottom heat[214]. Rooting should take place within 2 months and they can be put in their permanent positions in the autumn[214]. Division of suckers in the winter. They can be planted out direct into their permanent positions and usually establish well and quickly[K]. Layering in autumn[200].

nwatta Landscape Uses:Border, Seashore, Specimen. Succeeds in most soils[200], including poor ones[186], so long as they are not too dry[182, 200]. Grows well by water and in fairly wet soils[182]. Established plants are very drought resistant[186]. Requires a sunny position[3], seedlings failing to grow in a shady position and mature shrubs quickly dying if overshadowed by taller plants[186]. Does well in very sandy soils[1, 186]. Plants are very tolerant of maritime exposure[75], though they are fairly slow growing[75]. Although usually found near the coast in the wild, they thrive when grown inland[11] and are hardy to about -25°C[184]. A very ornamental plant[1, 11], it is occasionally cultivated, especially in N. Europe, for its edible fruit[183]. Members of this genus are attracting considerable interest from breeding institutes for their nutrient-rich fruits that can promote the general health of the body (see edible and medicinal uses below)[214]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[113, 186, 200]. Plants produce abundant suckers, especially when grown on sandy soils[186]. Dioecious. Male and female plants must be grown if seed is required. The sexes of plants cannot be distinguished before flowering, but on flowering plants the buds of male plants in winter are conical and conspicuous whilst female buds are smaller and rounded[11]. Plants in this genus are notably resistant to honey fungus[200]. Special Features:Not North American native, Naturalizing, Inconspicuous flowers or blooms.

5.1.3 Amphicarpaea bracteata

Hog Peanut, American hogpeanut
tfo2n 4 tlin 9 cyuc 5 kcaak 3 tcan 1 dwat 1.5 m hkuc
pcmhmm cyuti tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Amphicarpaea bracteata is a PERENNIAL CLIMBER growing to 1.5 m (5ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from May to October, in flower from August to September, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

ckakta Edible Parts: Root SeedEdible Uses: Seed - raw or cooked[2, 161]. Two types of seed are produced - flowers produced near the ground produce a pod that buries itself just below soil level. These pods contain a single seed are up to 15mm in diameter which can be used as a peanut substitute. They can be harvested throughout the winter and can be eaten raw or cooked[2, 63, 95, 161]. They are sweet and delicious raw with a taste that is more like shelled garden beans than peanuts[183]. Yields are rather low, and it can be a fiddle finding the seeds, but they do make a very pleasant and nutritious snack[K]. Other flowers higher up the plant produce seed pods that do not bury themselves. The seeds in these pods are much smaller and are usually cooked before being eaten[95, 183]. They can be used in all the same ways as lentils and are a good source of protein[K]. The overall crop of these seeds is rather low and they are also fiddly to harvest[K]. Root - cooked[177, 257]. The root is peeled, boiled and then eaten[257]. Fleshy and nutritious according to one report[200], whilst another says that the root is too small to be of much importance in the diet[257]. Our plants have only produced small and stringy roots[K].

tcanta Nitrogen Fixer.

dwatta An infusion of the root has been used in the treatment of diarrhoea[257]. Externally, the root has been applied to bites from rattlesnakes[257]. A poultice of the pulverized leaves has been applied with any salve to swellings[257].

nrakta Eastern N. America - New Brunswick to Florida, west to Manitoba and Louisiana. ksacta Cool damp woodlands[43, 200].

propta Seed - pre-soak for 12 hours in warm water and then sow in spring in a semi-shaded position in a greenhouse. Germination usually takes place within a few weeks. When large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter, planting them out in late spring or early summer. Division. We have been unable to divide this plant because it only makes a small taproot. However, many of the seeds are produced under the ground and these can be harvested like tubers and potted up to make more plants.

nwatta Agroforestry Services: Nitrogen Agroforestry Services: Understorey legume Historic Crop Management: Fodder Management: Standard Staple Crop: ProteinRequires a moist humus-rich soil in a shady position[200]. The young shoots in spring can be damaged by late frosts[K]. The hog peanut has occasionally been cultivated for its edible seed which has been used as a peanut substitute[183]. Yields at present, however, are rather low[K]. Two types of blossom are produced by the plant - those produced from the leaf axils mostly abort but a few seeds are produced[95]. Solitary, inconspicuous cleistogamous flowers are produced on thread-like stems near the root and, after flowering, the developing seedpods bury themselves into the soil in a manner similar to peanuts[95, 274]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A self-seeding plant [1-2]. Growth habit is herbaceous. Growth habit is a single or multiple shooting vine from a crown [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

5.1.4 Psoralea esculenta

Breadroot, Large Indian breadroot
tfo2n 4 tlin 8 cyuc 5 kcaak 3 tcan 1 dwat 0.3 m hkuc
htut cyuti kyuctcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Psoralea esculenta is a PERENNIAL growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from May to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

pcista This species contains furanocoumarins, these substances can cause photosensitivity in some people[65].

ckakta Edible Parts: Oil RootEdible Uses: OilRoot - raw or cooked[2, 4, 46, 57, 161]. It can also be dried for later use[183]. The dried root can be ground into a powder and used with cereals in making cakes, porridges etc[183]. Starchy and glutinous, the raw root is said to have a sweetish turnip-like taste[183]. The plant is best harvested as the tops die down at the end of the growing season[85]. This food is a staple and also considered to be a luxury item by many native North American Indian tribes[2, 61]. The root contains about 70% starch, 9% protein and 5% sugars[95].

tcanta Oil Soil stabilizationThe plant is a good soil stabilizer in its natural environment[200].

dwatta Pectoral Poultice StomachicAn infusion of the dried roots has been used in the treatment of gastro-enteritis, sore throats and chest problems[257]. The roots have been chewed by children as a treatment for bowel complaints[257]. A poultice of the chewed roots has been applied to sprains and fractures[257].

nrakta N. America - Manitoba to North Dakota and Wisconsin, south to Missouri and Texas. ksacta Rocky woods and prairies, on calcareous soils[43].

propta Pre-soak the seed for 24 hours in warm water and then sow in early to mid spring in a greenhouse. Either sow the seed in individual pots or pot up the young seedlings as soon as possible in order to avoid root disturbance. Grow them on in the pots until planting out in their final positions. It is usually impossible to transplant this species without fatal damage to the root[200]. Division in spring. With great care since the plant resents root disturbance. It is virtually impossible to divide this species successfully[200].

nwatta Succeeds in an ordinary garden soil[1]. Requires a well-drained soil in a sunny position[200]. Plants are very intolerant of root disturbance, they are best planted out into their permanent positions whilst still small[200]. This plant has been recommended for improvement through breeding and selection for its edible root[183]. It was sent to Europe around the year 1800 as a potential food crop but was not well received[213]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

5.1.5 *Elaeagnus orientalis*

Trebizond Date

tfo2n 4 tlin 9 cyuc 4 kcak 2 tcan 2 dwat 12 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjlutnyik hpa7tli flat-
prikkwis hpa7tmwatli xre7t hjonli

drutta *Elaeagnus orientalis* is a deciduous Shrub growing to 12 m (39ft) by 6 m (19ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in June. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

kcakta Edible Parts: Fruit SeedEdible Uses: Fruit - raw or cooked[3, 105]. Sweet and mealy but of better quality than the closely related *E. angustifolia*[183]. Eaten fresh or made into sherbet and preserves. The fruit must be fully ripe before it can be enjoyed raw, if even slightly under-ripe it will be quite astringent[K]. The oval fruit is about 10mm long and contains a single large seed[K]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous[K].

tcanta Hedge HedgePlants can be grown as a hedge in exposed positions, tolerating maritime exposure.

dwatta CancerThe fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta W. Asia. ksacta By streams and on river banks, to elevations of 3000 metres in Turkey[93].

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate in late winter or early spring, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pot as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Cuttings of mature wood of the current year's growth, 10 - 12cm

with a heel, October/November in a frame[200]. The cuttings are rather slow and difficult to root, leave them for 12 months[113]. Layering in September/October. Takes 12 months[78].

nwatta Succeeds in most soils that are well-drained[11, 200]. Prefers a soil that is only moderately fertile, succeeding in very poor soils and in dry soils[11, 200]. Established plants are very drought resistant[1]. Prefers a light sandy loam and a sunny position[11, 200]. Dislikes shallow chalk soils[98]. Very closely related to *E. angustifolia* and often considered to be no more than a sub-species of it[183], it does not flower so freely in Britain as that species[11]. This species is notably resistant to honey fungus[88, 200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. An excellent companion plant, when grown in orchards it can increase yields from the fruit trees by up to 10%. The flowers are very fragrant and are rich in nectar[183], they are much visited by bees. Occasionally cultivated for its edible fruit, there are some named varieties[183]. The fruit used to be commonly sold in the markets of Iran and Turkey but is rarely found there nowadays[183].

5.1.6 *Caragana brevispina*

Long-Stalked Pea-shrub

htu2n 4 tlin 9 cyuc 4 kcak 3 tcan 1 dwat 2.5 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjlut hpa7tli flatprik-
kwis hpa7tmwatli xre7t hjonli

drutta *Caragana brevispina* is a deciduous Shrub growing to 2.5 m (8ft) by 1.8 m (6ft). See above for USDA hardiness. It is hardy to UK zone 6. It is in flower in June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista Reports that this plant contains toxins have not been substantiated[65]. The occurrence of cystine in the seeds is doubtful[65].

kcakta Edible Parts: Leaves SeedEdible Uses: Seed - cooked[160]. Small but produced in abundance. The seed of a plant seen at the Royal Horticultural Gardens, Wisley in Surrey in September 1993 was about twice the size of *C. arborescens* but it had a distinctly bitter taste[K]. High in protein, it has been recommended as an emergency food for humans. Young buds - cooked as a green vegetable[272].

tcanta Hedge Hedge Soil stabilization WoodPlants can be grown as a hedge, they are very spiny and provide an impenetrable barrier. The extensive root system of this plant makes it useful for planting to control soil erosion. Wood - hard, close grained[146]. An important fuel wood for people living at high elevations[272].

dwatta A decoction of the plant is taken in the treatment of aching joints[272].

nrakta E. Asia - N.W. Himalayas.. ksacta Higher forests, in the undergrowth of fir and oak forests or in open glades on dry ridges from 1500 - 2700 metres[146].

propta Seed - best sown as soon as it is ripe in a cold frame[200]. It usually germinates in 2 weeks[K]. Stored seed should be pre-soaked for 24 hours in warm water then sown in a cold frame[78, 113, 200]. If the seed has not swollen then scarify it and re-soak for another 12 hours before sowing[138]. Germination usually takes place within 2 - 3 weeks at 20°C[138]. Good percentage[11]. As soon as they are large enough to handle, prick the seedlings out into individual pots and grow them on in a greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame[113]. Layering in spring.

nwatta Succeeds in most well-drained soils, but prefers full sun and a light sandy dry or well-drained soil[1, 11, 200]. Does not require a rich soil[11], succeeding on marginal land[160]. Succeeds in acid or alkaline soils[160]. Established plants are drought resistant[160]. This species is

hardly to at least -20°C[184], it prefers a continental climate with hot summers and cold winters so it does not grow so well in the milder western half of Britain[200]. Plants in this genus are notably resistant to honey fungus[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200].

5.1.7 *Desmanthus illinoensis*

Prairie Mimosa, Illinois bundleflower
tfo2n 4 tlin 8 cyuc 4 ckac 1 tcan 1 dwat 1.3 m hkuc
htut cyutli tcup hwicli hrasjlutnykfrp hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Desmanthus illinoensis* is a PERENNIAL growing to 1.3 m (4ft 3in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

ckakta Edible Parts: Seed Edible Uses: Seed - cooked. Rich in protein but without much flavour[183]. The seedpods are about 25mm long and contain 3 - 5 small seeds[235]. They are freely borne in the plants native environment, but will have to be very freely produced in this country if it is to be a worthwhile crop[K].

tcanta Root bark of *D. illinoensis* has been found to contain N,N-DMT, NMT, N-hydroxy-N-methyltryptamine, 2-hydroxy-N-methyltryptamine, and gramine (toxic). The root bark is mixed with a native source of beta-Carbolines to produce a hallucinogenic drink called prairiehuasca, which is an analog of the shamanic brew ayahuasca.

dwatta Antipruritic Ophthalmic A leaf tea has been used in the treatment of itchy skin[222, 257]. Five seeds have been placed in the eye at night and washed out in the morning to treat trachoma[257].

nrakta N. America - Ohio to N. Dakota, New Mexico to Mississippi. ksacta Prairies, river banks and fields[222, 235]. Ditches, stream bottoms, fields, roadsides and low areas, often on clay soils[274].

propta Seed - pre-soak for 12 hours in warm water and then sow in a cold frame in the spring. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant them out into their permanent positions in early summer. If you have sufficient seed then it is probably worthwhile sowing some in situ in mid to late spring.

nwacta Agroforestry Services: Nitrogen Management: Standard Staple Crop: Protein Under Development Requires a moist but well-drained soil in full sun[200]. Plants are often found growing in clay soils in the wild[274]. Suitable for the wild garden or other naturalistic wildt[200]. In favourable situations this plant can self-sow to the point of nuisance[200]. This plant is being evaluated by the Land Institute of Salina, Kansas, as an edible legume for growing with perennial grains in a non-tillage permaculture system[183]. It is certainly worthy of more attention in this country, though the small seed size mitigates against its use[K]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200].

5.1.8 *Medicago sativa*

Alfalfa, Yellow alfalfa
tfo2n 4 tlin 8 cyuc 4 ckac 4 tcan 3 dwat 1 m hkuc
htut cyutli hgaktyuctup hwicli hyishrasjlutnyk hpa7tli flatprikwlis hpa7tmwatli fyifxre7t hjonli

drutta *Medicago sativa* is a PERENNIAL growing to 1 m (3ft 3in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from June to July, and the seeds ripen from July to September. The species is

hermaphrodite (has both male and female organs) and is pollinated by Bees, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista The plant contains saponin-like substances[222]. Eating large quantities of the leaves may cause the breakdown of red blood cells[222]. However, although they are potentially harmful, saponins are poorly absorbed by the human body and so most pass through without harm. Saponins are quite bitter and can be found in many common foods such as some beans. Thorough cooking, and perhaps changing the cooking water once, will normally remove most of them from the food. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K]. Alfalfa sprouts (and especially the seeds) contain canavanine. Recent reports suggest that ingestion of this substance can cause the recurrence of systemic lupus erythematosus (an ulcerous disease of the skin) in patients where the disease had become dormant[222]. The FDA advises that children, the elderly and people with compromised immune systems should avoid eating alfalfa sprouts due to bacterial contamination. Avoid during pregnancy and lactation. Avoid for people with hormone sensitive cancer. Avoid for people with gout (due to purines). Possible antagonize the anticoagulant effect of warfarin (due to vit K) and interfere with the immunosuppressant effect of corticosteroids [301].

ckakta Edible Parts: Leaves Oil Seed Edible Uses: Oil Tea Leaves and young shoots - raw or cooked[2, 8, 52, 145]. The leaves can also be dried for later use[55]. Very rich in vitamins[183], especially A, B and C[201], they are also a good source of protein[206]. The leaves are a rich source of vitamin K[213]. A very nutritious food in moderation, though it can trigger attacks in patients with systemic lupus erythematosus and large quantities can affect liver function and cause photosensitization[238]. A nutritional analysis is available[218]. The seed is commonly used as a sprouted seed which is added to salads[2, 20, 52], used in sandwiches etc or cooked in soups[183]. The seed is soaked in warm water for 12 hours, then kept moist in a container in a warm place to sprout. It is ready in about 4 - 6 days[244]. The seeds can also be ground into a powder and used as a mush, or mixed with cereal flours for making a nutritionally improved bread etc[183, 213, 244]. Seed yields average around 186 - 280 kilos per hectare[269]. An appetite-stimulating tea is made from the leaves[21, 55], it has a flavour somewhat reminiscent of boiled socks[144] and is slightly laxative[159].

tcanta Biomass Companion Dye Green manure Hedge Hedge Oil Paper Often grown as a green manure. It is a bit slow to establish in its first year so is generally only recommended for positions where it can remain for 2 or more years. Alfalfa is very vigorous from its second year, producing a huge bulk of material that can be cut down 2 or 3 times during the season[20, 87]. Plants are very deep rooting, descending 6 metres or more into the soil[200], and are able to fix large quantities of atmospheric nitrogen, this makes them one of the very best green manures. Plants are rather intolerant of competition from grass etc, however, and there is the drawback of needing to leave them in the soil for more than 2 years to fully achieve their potential[K]. Alfalfa is a potentially excellent source of biomass. It is possible to produce more than 2 tonnes of protein from the leaves (suitable for human use) per hectare per year. In addition, the plant residues remaining could be used to produce the equivalent of about 10 barrels of oil per year[269]. A yellow dye is obtained from the seed[269]. The fibre of the plant has been used in making paper[269]. The seed yields about 8.5 - 11% of a drying oil. It is used in paints, varnish etc[46, 57, 61, 269]. The plant can be grown as a low dividing hedge in the vegetable garden[52, 206]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Anodyne Antibacterial Antiscorbutic Aperient Diuretic Emetic Febrifuge Haemostatic Hypoglycaemic Nutritive Stimulant Tonic Alfalfa leaves, either fresh or dried, have traditionally been used as a nutritive tonic to stimulate the appetite and promote weight gain[222]. The plant has an oe-

serotrogenic action and could prove useful in treating problems related to menstruation and the menopause[254]. Some caution is advised in the use of this plant, however. It should not be prescribed to people with auto-immune diseases such as rheumatoid arthritis[238]. See also the notes above on toxicity. The plant is antiscorbutic, aperient, diuretic, oxytocic, haemostatic, nutritive, stimulant and tonic[55, 165, 218]. The expressed juice is emetic and is also anodyne in the treatment of gravel[218]. The plant is taken internally for debility in convalescence or anaemia, haemorrhage, menopausal complaints, pre-menstrual tension, fibroids etc[238]. A poultice of the heated leaves has been applied to the ear in the treatment of earache[257]. The leaves can be used fresh or dried[238]. The leaves are rich in vitamin K which is used medicinally to encourage the clotting of blood[213]. This is valuable in the treatment of jaundice[213]. The plant is grown commercially as a source of chlorophyll and carotene, both of which have proven health benefits[222]. The leaves also contain the anti-oxidant tricin[222]. The root is febrifuge and is also prescribed in cases of highly coloured urine[218]. Extracts of the plant are antibacterial[218]. Used for asthma, diabetes, gastrointestinal disorders (anti-ulcer) [301].

nrakta Europe - Mediterranean. More or less naturalized in Britain[17]. ksacta Waste ground, avoiding acid soils[17].

propta Pre-soak the seed for 12 hours in warm water and then sow in spring in situ. The seed can also be sown in situ in autumn[52]. Seed can be obtained that has been inoculated with Rhizobium bacteria, enabling the plant to succeed in soils where the bacteria is not already present.

nwatta Global Crop Management: Hay Stack Crop: ProteinAlfalfa is a very versatile plant that can adapt to a wide range of climatic conditions from cold temperate to warm sub-tropical.[269]. It succeeds on a wide variety of soils[52, 269], but thrives best on a rich, friable, well-drained loamy soil with loose topsoil supplied with lime[269]. It does not tolerate waterlogging and fails to grow on acid soils[269]. Grows well on light soils[206]. The plant has a deep taproot and, once established, tolerates drought and extremely dry conditions[52, 269]. Prefers a neutral fertile soil[87] but succeeds in relatively poor soils so long as the appropriate Rhizobium bacteria is present[200]. A good bee plant[46] and a food plant for many caterpillars[30]. Alfalfa is a very deep rooting plant, bringing up nutrients from deep in the soil and making them available for other plants with shallower root systems. It is a good companion plant for growing near fruit trees and grape vines so long as it is in a reasonably sunny position, but it does not grow well with onions or other members of the Allium genus[201]. Growing alfalfa encourages the growth of dandelions[201]. Alfalfa has long been cultivated for its edible seed, which can be sprouted and eaten in salads. It is also grown as a green manure and soil restorer. There are many named varieties[183]. Botanists divide the species into a number of sub-species - these are briefly described below:-

M. sativa caerulea (Less. ex Ledeb.)Schmalh. This sub-species is likely to be of value in breeding programmes for giving cold tolerance, drought resistance and salt tolerance to alfalfa. M. sativa falcata (L.)Arcang. This sub-species is likely to be of value in breeding programmes for giving cold tolerance, drought and disease resistance plus salt and water-logging tolerance to alfalfa. M. sativa sativa. The commonly cultivated form of alfalfa. M. sativa varia (Martyn.)Arcang. This sub-species is likely to be of value in breeding programmes for giving cold tolerance, drought resistance and high yields to alfalfa. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available.

The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.1.9 Psoralea hypogaea

Small Indian Breadroot

tfo2n 4 tlin 8 cyuc 4 kcac 0 tcan 0 dwat 0.1 m hkuc htut cyutli kyuctup hwicli hrasjlut hpa7tli flatprikrlwis hpa7tmwatli xre7t hjonli

drutta Psoralea hypogaea is a PERENNIAL growing to 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 4. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

pcista Although no specific mention of toxicity for this species has been found, at least some members of this genus contain furanocoumarins, these substances can cause photosensitivity in some people[65].

ksakta Edible Parts: Root/Edible Uses: Root - raw or cooked[2, 62, 85, 161, 257]. Rich in starch[105]. The root can also be dried, ground into a powder and used in soups or with cereals for making bread etc[161]. The root is up to 60mm long and 15mm thick[60]. The root was an important food source for the native North American Indians[274].

tcanta Soil stabilization/The plant is a good soil stabilizer in its natural environment[200].

nrakta Western N. America - Great Plains, east to Nebraska and south to Oklahoma. ksacta Rocky or sandy prairies, bluffs and stream valleys[238].

propta Pre-soak the seed for 24 hours in warm water and then sow in early to mid spring in a greenhouse. Either sow the seed in individual pots or pot up the young seedlings as soon as possible in order to avoid root disturbance. Grow them on in the pots until planting out in their final positions. It is usually impossible to transplant this species without fatal damage to the root[200]. Division in spring. With great care since the plant resents root disturbance. It is virtually impossible to divide this species successfully[200].

nwatta Succeeds in an ordinary garden soil[1]. Requires a well-drained soil in a sunny position[200]. Plants are very intolerant of root disturbance, they are best planted out into their permanent positions whilst still small[200]. Some botanists have reclassified the plant and now call it Pediomelum hypogaeum[274]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200].

5.1.10 Vicia faba major

Broad Bean, Fava Bean

tfo2n 4 tlin 10 cyuc 4 kcac 3 tcan 1 dwat m hkuc hmimhtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flatprikrlwis hpa7tmwatli fyifxre7t hjonli

drutta Vicia faba major is an ANNUAL growing to 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista Although often used as an edible seed, there are reports that eating the seed of this plant can cause the disease 'Favism' in susceptible people[7, 76]. Inhaling the pollen can also cause the disease[7, 218]. Favism, which is a severe haemolytic anaemia due to an inherited enzymatic deficiency[218], only occurs in cases of excessive consumption of the raw seed (no more details are given[K]) and when the person is genetically inclined towards the disease[7, 213].

About 1% of Caucasians and 15% of Negroids are susceptible to the disease[218].

kcakta Edible Parts: Seed**Edible Uses:** Immature seed - raw or cooked. Broad bean seeds are very nutritious and are frequently used as items of food. The seeds can be eaten raw when they are small and tender, as they grow older they can be cooked as a vegetable[2, 7, 16, 132, 183]. They have a very pleasant floury taste[K]. There are some potential problems to the use of these seeds if they are consumed in large quantities[7] - see the notes above on toxicity. Mature seeds can be eaten cooked as a vegetable or added to soups etc[2, 7, 16, 183]. They are best soaked for 12 - 24 hours prior to cooking in order to soften them and reduce the cooking time[K]. They will also become more nutritious this way[K]. The flavour is mild and pleasant with a floury texture[K]. They can also be dried and ground into a flour for use in making bread etc with cereal flours[183]. The seed can also be fermented to make tempeh[183]. Made into a paste, they can be used as a sandwich filling[299]. The seed can be sprouted before being cooked[183]. Popped seeds can be salted and eaten as the snack or roasted like peanuts[183]. Young pods - cooked and eaten as a vegetable[183]. They quickly become fibrous as they grow larger[183], and also develop a hairy coating inside the pods that can become unpleasant as the pods get larger[K]. Young leaves - cooked. They are very nutritious and can be used like spinach[105, 183].

tcanta Fibre Soap makingAgroforestry Uses: The stems and leaves are sometimes used as a green manure[299]. Broad beans grow well with carrots, cauliflowers, beet, cucumber, cabbages, leeks, celeriac, corn and potatoes, but is inhibited by onions, garlic and shallots[18, 20]. Other Uses: A fibre is obtained from the stems. The burnt stems are rich in potassium and can be used in making soap. The dried stems can be burnt as a fuel[299].

dwatta DiureticThe seedpods are diuretic and lithon-
triptic[7].

nrakta Long cultivated for its seed, the original habitat is obscure. ksacta Not known in a truly wild situation.

propta Pre-soak the seed for 24 hours in warm water and then sow in situ in succession from late winter until early summer. Germination should take place in about 7 - 10 days. The earlier sowings should be of suitably hardy varieties such as the 'Longpods' whilst later sowings can be of the tastier varieties such as the 'Windsors'. By making fresh sowings every 3 weeks you will have a continuous supply of fresh young seeds from early summer until early autumn. If you want to grow the beans to maturity then the seed needs to be sown by the middle of spring. You may need to protect the seed from the ravages of mice. Another sowing can be made in middle to late autumn. This has to be timed according to the area where the plants are being grown. The idea is that the plants will make some growth in the autumn and be perhaps 15 - 20cm tall by the time the colder part of winter sets in. As long as the winter is not too severe, the plants should stand well and will grow away rapidly in the spring to produce an earlier crop. The plants will also be less likely to be attacked by blackfly. Make sure you choose a suitably hardy variety for this sowing.

nwatta Broad beans originated in warm temperate areas and can be cultivated from the cold temperate zone to the subtropics, and also at higher elevations from 1,300 - 3,800 metres in the tropics. It may flower well in the lowland tropics, but usually does not produce pods[299]

]. The ideal temperature range in the growing season is between 18 - 27°C, at higher temperatures the flowers are often aborted[200]

]. The plant requires an annual rainfall of 700 - 1,000mm, of which more than 60% should occur during the growing period[299]

]. Prefers a fairly heavy loam but succeeds in a sunny position in most soils that are well-drained[1

, 200
]. Grows well in heavy clay soils. Dislikes dry conditions according to some reports[87

, 200
], whilst another says that it is drought tolerant once established[132

]. Prefers a pH in the range 5.5 to 7[200

]. There are two main forms of this species - small seeded forms that are more commonly grown for feeding livestock and as a green manure, and larger seeded forms

that are usually grown for human food. Of the larger seeded forms there are two main types:- 'Longpod' beans are the more hardy and can be sown in the autumn in cool temperate areas. 'Windsor' beans, which are considered to be finer flavoured, are less tolerant of the cold and so are best sown in spring[132

]. Autumn sown varieties are more susceptible to 'chocolate spot' fungus, this problem can be alleviated by the addition of potash to the soil[87

]. Black fly can be a major problem. Autumn sown crops are less likely to be affected. Pinching out the soft tips of the plants, one they are tall enough and are beginning to flower, can reduce the problem since the blackfly always start on the soft shoots and then spread to the older stems. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200

]. When removing plant remains at the end of the growing season, it is best to only remove the aerial parts of the plant, leaving the roots in the ground to decay and release their nitrogen.

5.1.11 Hedysarum occidentale

Liquorice Root, Western sweetvetch
tfo2n 4 tlin 8 cyuc 4 kcak 0 tcan 0 dwat 0.1 m hkuc
htut cyutli tcup hwicli hrasjltutnyik hpa7tli flatpriklwis
hpa7tmwatli xre7t hjonli

dwatta Hedysarum occidentale is a PERENNIAL growing to 0.1 m (0ft 4in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Root**Edible Uses:** Root - raw or cooked[212]. Long and sweet with a liquorice-like flavour[183]. Used in the spring it is crisp and juicy' but it becomes tough and woody as the season advances.

nrakta Western N. America - Montana to Washington, south to Utah and Colorado. ksacta Dry and often rocky soils of open areas, from the plains to about 2,600 metres[212].

propta Seed - sow in a cold frame as soon as it is ripe or in the spring[200]. Stored seed should be pre-soaked for 24 hours in warm water. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant them out into their permanent positions in the summer. Division in spring. Great care is needed since the plant dislikes root disturbance[200].

nwatta Easily grown in ordinary garden soil in a sunny position, preferring a deep well-drained sandy loam[1, 200]. Plants strongly resent root disturbance and should be placed in their permanent positions as soon as possible[1]. This species is closely related to H. boreale[212]. Does well in the rock garden or border[1]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200].

5.2 mran

5.2.1 Tilia platyphyllos

Large Leaved Lime, Largeleaf linden, Bigleaf Linden
4 tlin 6 cyuc 5 kcak 4 tcan 3 dwat 30 m hkuc
hmimhtut cyutli tcup hwicli hrasjltutnyik hpa7tli flatpriklwis
hpa7tmwatli xre7t hjonli

drutta Tilia platyphyllos is a deciduous Tree growing to 30 m (98ft) by 20 m (65ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can

grow in semi-shade (light woodland) or no shade. If left for too long, they produce symptoms of narcotic intoxication[4].

kcakta Edible Parts: Leaves **Sap****Edible Uses:** Chocolate Tea/Young leaves - raw. A delicious addition to salads and sandwiches, the young leaves are mild and tender with a somewhat mucilaginous texture[K]. A very acceptable chocolate substitute can be made from a paste of the ground-up flowers and immature fruit. Trials on marketing the product failed because the paste is very apt to decompose[2, 115]. A popular herb tea is made from the flowers, it has a sweet, fragrant pleasant flavour. Some caution is advised, see notes above on toxicity. Sap - harvested in the spring, it is sweet and can be used as a drink or concentrated into a syrup[4].

tcanta Charcoal Fibre Paper WoodA fibre from the inner bark is used to make mats, shoes, baskets, ropes etc[1, 13, 14, 46, 61, 100]. It is also suitable for cloth[115]. It is harvested from trunks that are 15 - 30cm in diameter[115]. The fibre can also be used for making paper[189]. The stems are harvested in spring or summer, the leaves are removed and the stems steamed until the fibres can be stripped. The outer bark is removed from the inner bark by peeling or scraping. The fibres are cooked for 2 hours with lye and then beaten in a ball mill. The paper is beige in colour[189]. Wood - soft, white, easily carved. It is very suitable for carving domestic items and small non-durable items[4, 13, 46, 61, 115]. A charcoal made from the wood is used for drawing and has medicinal properties[7, 46, 61, 115].

dwatta Antispasmodic Diaphoretic Diuretic Expectorant**Hypotensive Laxative Sedative**Lime flowers are a popular domestic remedy for a number of ailments, especially in the treatment of colds and other ailments where sweating is desirable[9]. A tea made from the fresh or dried flowers is antispasmodic, diaphoretic, expectorant, hypotensive, laxative and sedative[4, 9, 13, 226, 238]. Lime flower tea is also used internally in the treatment of indigestion, hypertension, hardening of the arteries, hysteria, nervous vomiting or palpitation[4, 238]. The flowers are harvested commercially and often sold in health shops etc[226]. Lime flowers are said to develop narcotic properties as they age and so they should only be harvested when freshly opened[238]. A charcoal made from the wood is used in the treatment of gastric or dyspeptic disturbances and is also made into a powder then applied to burns or sore places[4]. It is also quite an effective vasodilator[7].

nrakta Europe, from Britain and Belgium south and east to Spain, Crimea, Caucasus and W. Asia. **ksacta Woods** on good calcareous or base rich soils[17].

propta Seed - much of the seed produced in Britain is not viable, cut a few seedcases open to see if there is a seed inside[80]. If possible, obtain fresh seed that is ripe but has not as yet developed a hard seed coat and sow it immediately in a cold frame. It may germinate in the following spring though it could take 18 months[80]. Stored seed can be very slow to germinate. It has a hard seed coat, embryo dormancy and a hard coat on the pericarp. All these factors mean that the seed may take up to 8 years to germinate[80]. One way of shortening this time is to stratify the seed for 5 months at high temperatures (10°C at night, up to 30°C by day) and then 5 months cold stratification[80]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Layering in spring just before the leaves unfurl. Takes 1 - 3 years[78]. Suckers, when formed, can be removed with as much root as possible during the dormant season and replanted immediately[200].

nwatta Landscape Uses: Espalier, Pollard, Screen, Specimen. Prefers a good moist loamy alkaline to neutral soil but succeeds on slightly acid soils[11, 200]. Grows poorly on any very dry or very wet soils[200]. Succeeds in sun or semi-shade[188]. Plants can be transplanted quite easily, even when quite large, trees up to 60 years old have been moved successfully[1, 74]. Lime trees are very long-lived[7] and are amenable to coppicing or pollarding. This species does not produce many suckers[98, 200]. Grows well in Britain, it is the only species that reliably produces viable seed in areas with cool summers[200]. Lime trees tend to hybridise freely if other members of the genus are growing nearby[238]. If growing plants from seed it is important to ensure the seed

came from a wild source or from an isolated clump of the single species[K]. Grows best in a woodland situation, young plants tolerate a reasonable level of side shade[200]. Mature trees cast a dense shade[186]. A very valuable bee plant, producing an abundance of nectar[7, 11, 125]. A valuable tree for wildlife, there are 31 species of insects associated with this tree[24]. A food plant for the caterpillars of many butterfly and moth species[30]. Trees are usually attacked by aphids which cover the ground and the leaves with a sticky honeydew[188]. There are some named varieties selected for their ornamental value[188]. Plants in this genus are notably resistant to honey fungus[200]. **Special Features:** Not North American native, Fragrant flowers, Attractive flowers or blooms.

5.2.2 Corylus hybrids

Hybrid and Neohybrids, Hazel, Filbert

4 tin 9 cyuc 5 kcak 5 tcan 2 dwat 25 m hkuc hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikli-wisslip hpa7tmwatli hjonli

drutta Corylus hybrids is a deciduous Shrub growing to 25 m (82ft) by 20 m (65ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid and very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Carbon Farming Solutions - Staple Crop: protein-oil (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world). Hazelnuts are among the best perennial protein and oil staple crops for temperate and boreal climates. Hybrids and neohybrid hazels are of increasing importance [1-1].

tcanta Carbon Farming Solutions - Other Systems: woody agriculture. See individual species.

dwatta See individual species.

nrakta Hybrid ksacta Native to the temperate Northern Hemisphere. See individual species.

propta Seed - best sown as soon as it is harvested in autumn in a cold frame[164]. Germinates in late winter or spring. Stored seed should be pre-soaked in warm water for 48 hours and then given 2 weeks warm followed by 3 - 4 months cold stratification[164]. Germinates in 1 - 6 months at 20°C[164]. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame or sheltered place outdoors for their first winter. Plant them out into their permanent positions in late spring or early summer[K]. Layering in autumn. Easy, it takes about 6 months[78, 200]. Division of suckers in early spring. Very easy, they can be planted out straight into their permanent positions.

nwatta Climate: boreal to warm temperate, Mediterranean. Humidity: semi-arid to humid. Carbon Farming Solutions - Cultivation: new crop. Management: standard, coppice (Describes the non-destructive management systems that are used in cultivation) [1-1].

5.2.3 Quercus ilex

Holly Oak, Evergreen Oak

4 tin 10 cyuc 5 kcak 3 tcan 2 dwat 25 m hkuc hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikli-wisslipshom hpa7tmwatli hjonli

drutta Quercus ilex is an evergreen Tree growing to 25 m (82ft) by 20 m (65ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 7. It is in leaf all year, in flower from May to June, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

ksakta Edible Parts: Oil SeedEdible Uses: Coffee OilSeed - raw or cooked[1, 2, 46, 61]. It can be sweet or bitter[K]. The seed is up to 3cm long[200], it can be dried, ground into a powder and used as a thickening in stews etc or mixed with cereals for making bread. The seed from some trees contains bitter tannins, these can be leached out by thoroughly washing the seed in running water though many minerals will also be lost. Either the whole seed can be used or the seed can be dried and ground it into a powder. It can take several days or even weeks to properly leach whole seeds, one method was to wrap them in a cloth bag and place them in a stream. Leaching the powder is quicker. A simple taste test can tell when the tannin has been leached. The traditional method of preparing the seed was to bury it in boggy ground overwinter. The germinating seed was dug up in the spring when it would have lost most of its astringency. The roasted seed is a coffee substitute. An edible oil is obtained from the seed[183]. One reader noted the Q. suber population of the Mamora forest in Morocco contains only sweet acorns and can be eaten raw, it has a similar taste to raw chestnuts. The skin removes quite easily Quercus ilex also exists with tannin-free acorns in the Moroccan forests, the locals say around 20 percent are sweet.

tcanta Fodder Fuel Hedge Oil Repellent Shelterbelt Tannin WoodLandscape Uses: Specimen, Street tree. A mulch of the leaves repels slugs, grubs etc, though fresh leaves should not be used as these can inhibit plant growth[20]. Oak galls are excrescences that are sometimes produced in great numbers on the tree and are caused by the activity of the larvae of different insects. The insects live inside these galls, obtaining their nutrient therein. When the insect pupates and leaves, the gall can be used as a rich source of tannin, that can also be used as a dyestuff[4]. Very tolerant of maritime exposure and of trimming, it can be grown as a shelterbelt tree or hedge in maritime areas[11, 29, 49, 75]. Wood - strong, hard, durable. Used for furniture[46, 61, 89]. It makes a good charcoal[89] and a good fuel, burning well even if green[146]. The bark is a source of tannin[146]. Heat Zone: 9-2.

dwatta Astringent DysenteryAny galls produced on the tree are strongly astringent and can be used in the treatment of haemorrhages, chronic diarrhoea, dysentery etc[4].

nrakta Europe - Mediterranean. Occasionally naturalized in Britain in S. England[17]. ksacta Arid places, maquis, woods and hills on limestone[89].

propta Seed - it quickly loses viability if it is allowed to dry out. It can be stored moist and cool overwinter but is best sown as soon as it is ripe in an outdoor seed bed, though it must be protected from mice, squirrels etc. Small quantities of seed can be sown in deep pots in a cold frame. Plants produce a deep taproot and need to be planted out into their permanent positions as soon as possible, in fact seed sown in situ will produce the best trees[11]. Trees should not be left in a nursery bed for more than 2 growing seasons without being moved or they will transplant very badly.

nwatta Fodder: Mast Industrial Crop: Tannin Management: Standard Other Systems: Dethesa Regional Crop Staple Crop: Balanced carbPrefers a good deep fertile loam which can be on the stiff side[11]. Thrives on shallow chalky soils[188]. Succeeds in all soils except those that are cold and poorly drained[98]. Grows well in sandy soils[188]. Young plants tolerate reasonable levels of side shade[200]. Very resistant to maritime exposure[11, 49, 75]. A very ornamental tree[1] but it is quite slow-growing[75]. Transplants badly unless moved regularly and this should be done as growth commences in late May or in September[11]. Fruits very freely in Britain[K]. The seed ripens in its first year[200]. The sub-species Q. ilex ballota is cultivated for its sweet-tasting edible seed in Portugal and Spain[K]. Hybridizes freely with other members of the genus[200]. This species is notably resistant to honey fungus[88, 200]. Special Features: Not North American native, inconspicuous flowers or blooms. The plant is heat tolerant in zones 9 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the

plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

5.2.4 Diospyros virginiana

American Persimmon, Common persimmon, Persimmon 4 tin 8 cyuc 5 kcac 3 tcan 1 dwat 20 m hkuc hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis hpa7tmwatli nyanhjen hjonli

drutta Diospyros virginiana is a deciduous Tree growing to 20 m (65ft 7in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in June, and the seeds ripen from October to November. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Insects, wind. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Fruit OilEdible Uses: Coffee Oil Sweetener TeaFruit - raw, cooked or dried and used in breads, cakes, pies, puddings etc[46, 183]. About the size of a plum, the fruit has an exquisitely rich flavour when it is fully ripe (and almost at the point of going bad) but it is very harsh and astringent before then[2, 3, 171, K]. The fruit may not ripen properly in a cool summer, though if it is frosted it normally develops a very good flavour[K]. The fruit can also be harvested in the autumn, preferably after a frost, and bled. (This is a process where the fruit is kept in a cool place and only eaten when it is very soft and almost at the point of going rotten). Much of the fruit on trees in a relatively sunny position at Kew after a relatively warm summer in 1996 was still not fully ripe, though it was very nearly so and ripened well off the tree[K]. The fruit can also be dried and used in bread, cakes etc. The fruit is up to 4.5cm in diameter[200]. Molasses can be made from the fruit pulp[183]. An oil obtained from the seeds is said to taste like peanut oil[222]. A tea is made from the dried leaves[102]. It is high in vitamin C and has a pleasant flavour somewhat like saffras[21, 183]. The roasted seed is used as a coffee substitute[177, 183].

tcanta Oil Soil stabilization WoodCan be used as a rootstock for D. kaki[46]. Wood - strong, hard, heavy, fine-grained, elastic, resistant to wear. A valuable wood, it is used for making wooden ware, turnery etc[46, 82, 149, 171]. It is used especially for making handles for golf clubs[149].

dwatta Antiscorbutic Astringent Vitamin C WartsA decoction of the boiled fruit was used to treat bloody stools[213]. (This probably refers to the unripe fruit, which is very astringent[K]). The leaves are rich in vitamin C and are used as an antiscorbutic[213]. A decoction of the inner-bark is highly astringent[149, 222]. It has been used as a mouth rinse in the treatment of thrush and sore throats[213, 222]. Used externally as a wash for warts or cancers[222].

nrakta Eastern N. America - New England to Florida, west to Texas and Kansas. ksacta Dry woods, old fields and clearings[43], on light well-drained sandy soils[82]. Found on most soil types from sands to shales and mud bottomlands[149].

propta Seed - best sown in a cold frame as soon as it is ripe[113, 200]. Stored seed requires cold-stratification and should be sown as early in the year as possible[78]. It usually germinates in 1 - 6 months at 15°C[175]. Pot up the young seedlings as soon as they are large enough to handle into fairly deep pots and plant them out in early summer. Give the plants some protection from winter cold for their first winter or two outdoors. Cuttings of half-ripe wood, July/August in a frame[200]. Layering in spring[200].

nwatta Requires a good deep loamy soil in sun or light shade[200]. If being grown for its fruit, the tree requires a warm, sunny, sheltered position[K]. It dislikes very acid or wet and poorly drained soils[200]. Plants are somewhat tender when young[11], though dormant mature trees are hardy to about -35°C[160]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the

in a position sheltered from the early morning sun[K]. Dioecious, but the female tree can produce seedless fruits in the absence of a pollinator[1]. It is likely that unfertilized fruits are more astringent than fertilized fruits since this is the case with *D. kaki*[K]. Trees can start producing fruit when only a few years old, a specimen seen at Kew Botanical gardens in autumn 1996 was only 1.5 metres tall and was bearing a very large crop of fruit[K]. This species is occasionally cultivated for its edible fruit, there are several named varieties[82, 183]. 'Dooley' grows well near the northern limits of persimmon culture[183]. 'Geneva Red' also grows well at the northern limits of persimmon culture. The fruit is medium to large[183]. 'Meader' grows well in cooler areas, it is self-fertile[183]. Plants have a long tap root and are difficult to transplant[149, 200], it is best to plant them out in their permanent position as soon as possible and to give protection overwinter for the first year or two[K]. The ssp. *D. virginiana* *platycarpa* has sweet succulent flesh, it grows wild from Missouri to Arkansas[82]. Special Features: Attracts birds, North American native, Attracts butterflies, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

5.2.5 Actinidia arguta

Tara Vine
4 tlin 8 cyuc 5 kcaak 2 tcan 0 dwat 15 m hkuc
hmmihtut cyutli tcup hwicli hrasjutnyik hpa7tli flatpriklwis
hpa7tmwatli nyanhjen hjonli

drutta *Actinidia arguta* is a deciduous Climber growing to 15 m (49ft 3in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in leaf from May to November, in flower from June to July, and the seeds ripen in October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Bees, insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit SapEdible Uses: Fruit - raw, cooked or dried for later use[1, 3, 61, 105]. Sweeter than *A. deliciosa*, the kiwi fruit[183], the skin is smooth and can be eaten with the fruit[K]. The fruit contains up to 5 times the vitamin C content of blackcurrants[74]. Highly esteemed according to one report[151] whilst another says that they are insipid[11]. The fruits are greenish-yellow or purple-red when mature and are about 2 to 3cm long[198, 266]. They contain a number of small seeds, but these are easily eaten with the fruit[K]. The plant is rich in sap and this can be tapped and drunk in the spring[105, 177, 183].

nrakta E. Asia - China, Japan ksakta Climbing up trees in woodland, mountain forests, thickets, streambanks and moist places at elevations of 700 - 3600 metres[11, 198, 266].

propta Seed - sow spring in a greenhouse[133]. It is probably best if the seed is given 3 months stratification[113], either sow it in a cold frame as soon as it is ripe in November or as soon as it is received. Fresh seed germinates in 2 - 3 months at 10°C, stored seed can take longer[133]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. When the plants are 30cm or more tall, plant them out into their permanent positions in late spring or early summer, after the

last expected frosts[K]. Most seedlings are male[126]. The seedlings are subject to damping off, so they must be kept well ventilated[113]. Cuttings of softwood as soon as ready in spring in a frame[K]. Cuttings of half-ripe wood, July/August in a frame. Very high percentage[113]. Cuttings of ripe wood, October/November in a frame.

nwatta Prefers a sound loamy neutral soil[1, 200]. Tolerates acid and moderately alkaline soils[202]. Succeeds in semi-shade but full sun is best for fruit production[200]. Prefers a sheltered position[200]. A very hardy plant, tolerating temperatures down to -30°C or more, but the young spring growth is susceptible to frost damage[160]. Some cultivars are said to tolerate temperatures down to about -50°C when fully dormant[160]. This species is often cultivated for its edible fruit and it is increasingly being seen as having potential in Britain. There are some named varieties[183]. Plants are usually dioecious but the cultivar 'Isai' is self-fertile[200]. A polymorphic species[74]. Fruits are formed on second year wood and also on fruit sprouts on older wood[126], any pruning is best carried out in the winter[219]. Plants only flower when grown in warm climates[202]. This species flowers well in gardens in the south and west of Britain[219], the small flowers being sweetly scented[245]. This is a climbing plant, supporting itself by twining around branches etc[200]. Male and female plants must usually be grown if seed is required. Plants in this genus are notably resistant to honey fungus[200]. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Woody. Growth habit is a single or multiple shooting vine from a crown [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2].

5.2.6 Prunus domestica

Plum, European plum

4 tlin 9 cyuc 5 kcaak 3 tcan 2 dwat 12 m hkuc
hmmihtut cyutli tcup hwicli hrasjutnyikfrip hpa7tli flatpriklwis
hpa7tmwatli fyifxre7t hjonli

drutta *Prunus domestica* is a deciduous Tree growing to 12 m (39ft) by 10 m (32ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in April, and the seeds ripen from July to November. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Flowers Fruit Oil Oil SeedEdible Uses: Gum Oil Oil TeaFruit - raw or cooked[1, 2, 7, 46]. The fruit varies considerably from cultivar to cultivar, but it is generally somewhat mealy, soft and juicy with a delicious flavour ranging from very sweet to acid[K]. The more acid fruits are usually only used for cooking purposes[K]. The fruit varies widely in size according to cultivar but can be 8cm long

contains a single large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity. An edible gum is obtained from points of damage on the trunk[64]. The seed contains about 20% of an edible semi-drying oil[4, 57]. It has an agreeable almond smell and flavour[4]. The flowers are eaten. They are used as a garnish for salads and ice cream or brewed into a tea[183].

tcanta Adhesive Dye Gum Oil Oil WoodA green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. A yellow dye is obtained from the bark[115]. A gum obtained from points of damage along the stem can be used as an adhesive[64]. The ground up seeds are used cosmetically in the production of face-masks for dry skin[7]. A semi-drying oil is obtained from the seed[64]. No details of its uses. Wood - hard, compact. Used for musical instruments[115].

dwatta Febrifuge Laxative StomachicThe dried fruit, known as prunes, is a safe and effective laxative and is also stomachic[4, 7, 21, 238]. The bark is sometimes used as a febrifuge[7]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta Europe to W. Asia. Naturalized in Britain. A hybrid *P. spinosa* x *P. cerasifera* *divaricata*. **ksacta** Found in hedges in Britain[17].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Requires a well-drained moisture retentive soil[1, 11] and a sheltered position[200]. Succeeds in light shade but fruits better in a sunny position[11, 200]. Thrives in a loamy soil, doing well on limestone[11]. Grows well in heavy clay soils. Prefers some chalk in the soil but it is apt to become chlorotic if too much is present[1]. Prefers a pH between 6 and 6.5[200]. The plum is widely cultivated for its edible fruit in temperate zones, there are many named varieties able to supply fresh fruits from late July to November or December[183]. Many cultivars are fully self-fertile, though some are partially self-sterile and others require cross-pollination[200]. Where space is at a premium, or at the limits of their climatic range, plums can be grown against a wall. Most cultivars will grow well against a sunny south or west facing wall, whilst an east facing wall will suit some of the tougher cultivars, a north facing wall is not really suitable[219]. This species is probably a hybrid of ancient origin between *P. spinosa* and *P. cerasifera*, coupled with chromosome doubling[17]. It does not cross-pollinate with the Japanese plum, *P. salicina*[200]. Prefers growing in a continental climate, mild winters tend to encourage earlier flowering with a greater risk of frost damage to the blossom. In Britain the best fruits are produced away from the western side of the country. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 8 through 3. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure consid-

erations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is flat with shallow roots spreading near the soil surface. The root pattern is suckering with new plants from runners away from the plant [2-1].

5.2.7 *Rubus procerus*

Himalayan Giant Blackberry

4 tin 8 cyuc 5 kcaak 2 tcan 0 dwat 10 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis hpa7tmwatli fyfixre7t hjonli

drutta *Rubus procerus* is a deciduous Shrub growing to 10 m (32ft 10in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit **Edible Uses:** Fruit - raw or cooked in pies, cakes etc[3, 105, 183]. The fruit can also be dried for later use[183]. Very large for a blackberry[50, 183] with a very pleasant rich flavour when fully ripe[K].

tcanta DyeA purple to dull blue dye is obtained from the fruit[168].

nrakta C. Europe. **ksacta** Not known

propta Seed - requires stratification and is best sown in early autumn in a cold frame. Stored seed requires one month stratification at about 3°C and is best sown as early as possible in the year. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Cuttings of half-ripe wood, July/August in a frame[200]. Tip layering in July. Plant out in autumn. Division in early spring or just before leaf-fall in the autumn[200].

nwatta Easily grown in a good well-drained loamy soil in sun or semi-shade[1, 11, 200]. A form of this species, known as 'Himalayan giant', is commonly cultivated in temperate zones for its edible fruit[50]. Although a blackberry, the stems are often perennial and can fruit for more than one year[50]. This name may be wrongly applied. According to the new RHS Dictionary of Gardening, the correct name for the 'Himalayan Giant' blackberry is *R. procerus*. P.J.Muell., the name *R. discolor* is misapplied. Plants in this genus are notably susceptible to honey fungus[200].

5.2.8 *Crataegus pedicellata*

Scarlet Haw, Scarlet hawthorn

4 tin 8 cyuc 5 kcaak 2 tcan 2 dwat 7 m hkuc
hmimhtut cyutli hgattcupha7n hwicli hrasjlutnyikfrp hpa7tli flatprikwlissil hpa7tmwatli xre7t hjonli

drutta *Crataegus pedicellata* is a deciduous Shrub growing to 7 m (23ft) by 7 m (23ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to May, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit **Edible Uses:** Fruit - raw or cooked[K]. A very variable species, especially in its fruit which ranges considerable in size and quality[K]. Up to 10mm long and pear shaped, the flesh is sweet but dry and mealy[200]. Another report says that the fruit is up to 20mm in diameter[235] and we have often seen fruits this size, or even a bit larger[K]. We find the fruits of the best forms to have an excellent flavour and juicy texture when fully ripe, but with a hint of bitterness before then[K]. They are one of the later members of this genus to ripen their fruit[K]. The fruit can be used in making pies, preserves, etc, and can also

Use dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Northeastern N. America - Connecticut to Ontario, Illinois and Pennsylvania. Naturalized in Britain. ksacta Self-sown in hedges and rough ground in south-eastern England.

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Plants are hardy to at least -18°C[202]. A very variable species, it has been divided up into several different species by some botanists[82]. The sub-species *C. pedicellata gloriosa*. Sarg. has larger fruits than the type[11]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A user in Poland says that *Crataegus pedicellata* exists in the wild in Eastern Poland and can support winter temperatures at least until -30C.

5.2.9 Amelanchier x grandiflora

Apple Serviceberry

4 tlin 7 cyuc 5 kcaok 0 tcan 0 dwat 6 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyikfrip hpa7tli flatprik
hpa7tmwatli fyifxre7t hjonli

drutta *Amelanchier x grandiflora* is a deciduous Shrub growing to 6 m (19ft) by 4 m (13ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in April, and the seeds ripen from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and

heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Edible Uses: Edible fruit - raw or cooked[200]. Sweet and succulent with a flavour of apples[K], they can also be dried for later use[183]. The fruit is rich in iron and copper[226]. It is up to 10mm in diameter[200].

nrakta A hybrid of garden origin, *A. arborea* x *A. laevis*. ksacta Not known in the wild.

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nwatta Landscape Uses: Firewood, Specimen, Woodland garden. Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not too dry or water-logged[11]. Grows well in heavy clay soils. Prefers an acid or neutral soil. Plants are hardy to about -25°C[184]. This species does not produce suckers[184]. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible ornamentals. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. This species is occasionally cultivated for its edible fruits, there are some named varieties[200]. The fruit is freely produced in Britain[184]. Considerable confusion has existed between this species, *A. arborea*, *A. canadensis*, *A. lamarckii* and *A. laevis*, see [11 and 200] for the latest (1991) classification. Hybridizes freely with other members of this genus[200]. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1]. Special Features: Not North American native, Attracts butterflies, Blooms are very showy.

5.2.10 Corylus avellana

Common Hazel, Common filbert, European Filbert, Harry Linder's Walking Stick, Corkscrew Hazel, Hazel
4 tlin 8 cyuc 5 kcaok 5 tcan 2 dwat 6 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli frusflatprik-
wliwssip hpa7tmwatli dyat hjonli

drutta *Corylus avellana* is a deciduous Tree growing to 6 m (19ft) by 3 m (9ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from January to April, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid and very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Oil Oil Seed Edible Uses: Milk Oil Oil Seed - raw or roasted and used in breads, cakes, biscuits, sweets etc[2, 5, 9, 12, 13, 34, 183]. An excellent nut for raw eating[K]. They can also be liquidized and used as a plant milk[183]. Rich in oil. The seed ripens in mid to late autumn and will probably need to be protected from squirrels[K]. When kept in a cool place, and not shelled, the seed should

store for at least 12 months[K]. A clear yellow edible oil is obtained from the seed[7, 9, 183]. It is used in salad dressings, baking etc.

tcanta Basketry Charcoal Cosmetic Hedge Hedge Miscellany Oil Oil Plant support Polish Tannin WoodThe seed contains up to 65% of a non-drying oil, used in paints, cosmetics etc[13, 46, 57, 132]. The whole seed can be used to polish and oil wood[6]. It is very easy to apply and produces a nice finish[K]. The finely ground seeds are used as an ingredient of face masks in cosmetics[7]. Plants can be grown as a tall hedge[29]. They need to be left untrimmed or only lightly trimmed if seed is required[29]. The bark and leaves are a source of tannin[7]. Wood - soft, easy to split, not very durable, beautifully veined. Used for inlay work, small items of furniture, hurdles, wattles, basketry, pea sticks etc[7, 13, 23, 46, 61, 63, 66, 125]. The twigs are used as dowling rods by water diviners[11]. The wood also yields a good quality charcoal, used by artists[63, 101].

dwata Anthelmintic Astringent Diaphoretic Febrifuge Miscellany Nutritive Stomachic TonicThe bark, leaves, catkins and fruits are sometimes used medicinally[7]. They are astringent, diaphoretic, febrifuge, nutritive and odontalgic[7]. The seed is stomachic and tonic[240]. The oil has a very gentle but constant and effective action in cases of infection with threadworm or pinworm in babies and young children[7].

nrakta Europe, including Britain, from Norway to Spain and east to W. Asia. ksacta Woods and hedgerows, especially on the slopes of hills, often on calcareous soils[7, 17].

propta Seed - best sown in a cold frame as soon as it is harvested in autumn in a cold sown[164]. Germinates in late winter or spring. Stored seed should be pre-soaked in warm water for 48 hours and then given 2 weeks warm followed by 3 - 4 months cold stratification[164]. Germinates in 1 - 6 months at 20°C[164]. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame or sheltered place outdoors for their first winter. Plant them out into their permanent positions in late spring or early summer[K]. Layering in autumn. Easy, it takes about 6 months[78, 200]. Division of suckers in early spring. Very easy, they can be planted out straight into their permanent positions.

nwatta Global Crop Industrial Crop: Biomass Management:

Copice Management: Standard Staple Crop: Protein-oilLandscape Uses:Container, Standard, Specimen. An easily grown plant, it succeeds in most soils, but is in general more productive of seeds when grown on soils of moderate fertility[11, 200]. It does less well in rich heavy soils or poor ones[11, 63]. Does well in a loamy soil[11]. Very suitable for an alkaline soil[11], but it dislikes very acid soils[17]. Succeeds in a pH range 4.5 to 8.5, but prefers a range of 5 to 7[200]. Plants are fairly wind tolerant[1, 11]. A very hardy plant, succeeding in all areas of Britain[200]. The flowers, however, are produced in late winter and early spring and can be damaged by heavy frosts at this time[200]. A parent, together with *C. maxima*, of many cultivated forms of filberts and cob nuts. There are many named varieties[11]. Plants are self-fertile but a more certain crop is obtained if more than one cultivar is grown[200]. The main difference between cob nuts and filberts is that the husk of a filbert is longer than the seed and often completely encloses it, whilst the husk on a cob nut is shorter than the seed[200]. Squirrels are a major pest of this plant, often decimating the crop of nuts[200]. Often grown as a coppiced shrub in woodlands, the stems have a variety of uses[23, 67, 186]. Members of this genus bear transplanting well and can be easily moved even when relatively large[11]. A food plant for the caterpillars of many lepidoptera species[30]. Special Features:Not North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is

also useful and given here if available. A clumping plant, forming a colony from shoots away from the crown but with a limited spread [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

5.2.11 *Pyrus communis sativa*

Pear

4 tlin 8 cyuc 5 kcaak 3 tcan 0 dwat 5 m hkuc hmimhtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flat-priklwis hpa7tmwatli dyatxre7t hjonli

drutta *Pyrus communis sativa* is a deciduous Tree growing to 5 m (16ft 5in). See above for USDA hardness. It is hardy to UK zone 4 and is not frost tender. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked. The flavour ranges from rather harsh and astringent (cultivars used for making alcoholic drinks) through to soft, sweet and very juicy. The best dessert fruits have an exquisite sweet flavour, usually with a very soft flesh, whilst cooking varieties have harder less sweet flesh[K].

tcanta Dye WoodA yellow-tan dye is obtained from the leaves[106, 115]. Wood - heavy, tough, durable, fine grained, hard. Used by cabinet and instrument makers[11, 61, 100, 149]. When covered with black varnish it is an excellent ebony substitute[74].

nrakta A garden cultivar, probably derived from *P. communis*, *P. cordata* and *P. nivalis*[11]. ksacta Not known in the wild.

propta Seed - best sown in a cold frame as soon as it is ripe in the autumn, it will then usually germinate in mid to late winter. Stored seed requires 8 - 10 weeks cold stratification at 1°C and should be sown as early in the year as possible[200]. Temperatures over 15 - 20°C induce a secondary dormancy in the seed[200]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in a cold frame or greenhouse for their first year. Plant them out in late spring or early summer of the following year. The seed of pear cultivars will not usually breed true to type.

nwatta Prefers a good well-drained loam in full sun[200]. Grows well in heavy clay soils[200]. Tolerates light shade but does not fruit so well in such a position. Tolerates atmospheric pollution, excessive moisture and a range of soil types if they are moderately fertile, though plants can become chlorotic on very alkaline soils[200]. Established plants are drought tolerant[200]. Very hardy, tolerating temperatures down to below -15°C[200]. Widely cultivated for its edible fruit in temperate areas, there are many named varieties that can provide fruit from late July to April or May of the following year. This is the collective name for all the pear cultivars that have been derived from *P. communis*, probably through hybridization with *P. cordata* and *P. nivalis*. Where space is at a premium, or at the limits of their climatic range, pears can be grown against a wall. Most cultivars will grow well against a sunny south or west facing wall but, because of their relatively early flowering, they are not really suitable for north or east facing walls[219]. Most cultivars are not self-fertile and a number of cultivars have incompatible pollen, so care must be taken to ensure the provision of a suitable pollen partner[200]. Trees grow less well in grass, root secretions from the grass inhibiting the root growth of the pear[201]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

5.2.12 Amelanchier alnifolia

Saskatoon, Saskatoon serviceberry, Serviceberry
4 tin 6 cyuc 5 kcaak 3 tcan 2 dwat 4 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikli-
wis hpa7tmwatli fyifxre7t hjonli

drutta Amelanchier alnifolia is a deciduous Shrub growing to 4 m (13ft) by 3 m (9ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower in May, and the seeds ripen from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. (Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: TeaEdible fruit - raw or cooked[3, 11, 46, 62, 101]. The fruit ripens in mid summer (early July in southern Britain), it is soft and juicy with a few small seeds in the centre. A very nice sweet flavour that is enjoyed by almost everyone who tries it, there is a hint of apple in the taste[K]. About the size of a blackcurrant, the fruit is produced in small clusters and the best wild forms can be 15mm in diameter[200, 212]. The fruit can also be dried and used as raisins or made into pemmican[101, 183]. The fruit is rich in iron and copper[226]. The leaves are a tea substitute[161, 257].

tcanta Shelterbelt Soil stabilizationPlants have a spreading, suckering root system and are used in windbreaks for erosion control[200]. Young branches can be twisted to make a rope[257]. Wood - hard, straight grained, tough. Used for tool handles etc. The wood can be made even harder by heating it over a fire and it is easily moulded whilst still hot[99]. The young stems are used to make rims, handles and as a stiffening in basket making[257]. Landscape Uses: Erosion control, Massing, Woodland garden. Hedging and Screens, Architectural City and Courtyard Gardens Cottage and Informal Garden, Wildlife Gardens (RHS).

dwatta Appetizer Birthing aid Contraceptive Diaphoretic Febrifuge Laxative Ophthalmic StomachicSaskatoon was quite widely employed as a medicinal herb by the North American Indians, who used it to treat a wide range of minor complaints[257]. It is little used in modern herbalism. An infusion of the inner bark is used as a treatment for snow-blindness[172]. A decoction of the fruit juice is mildly laxative. It has been used in the treatment of upset stomachs, to restore the appetite in children, it is also applied externally as ear and eye drops[257]. A decoction of the roots has been used in the treatment of colds[257]. It has also been used as a treatment for too frequent menstruation[257]. A decoction of the stems, combined with the stems of snow-berry (*Symphoricarpos* spp) is diaphoretic. It has been used to induce sweating in the treatment of fevers, flu etc and also in the treatment of chest pains and lung infections[257]. A decoction of the plant, together with bitter cherry (*Prunus emarginata*) has been used as a contraceptive[257]. Other recipes involving this plant have also been used as contraceptives including a decoction of the ashes of the plant combined with the ashes of pine branches or buds[257]. A strong decoction of the bark was taken immediately after childbirth to hasten the dropping of the placenta. It was said to help clean out and help heal the woman's insides and also to stop her menstrual periods after the birth, thus acting as a form of birth control[257].

nrakta Western and Central N. America - Saskatchewan and south to Colorado and Idaho. ksacta Thickets, woodland edges and banks of streams[43] in moist well-drained soils[99, 200]. Small bushy forms grow on fairly dry hillsides[212].

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for

two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nwatta Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not too dry or water-logged[11]. Plants are fairly lime tolerant[200], they also grow well in heavy clay soils. Hardy to about -20°C according to one report[184], whilst another suggests that this species is hardy to about -50°C[11]. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible ornamentals. This species is particularly interesting because it is quite compact and produces an excellent quality quite large fruit[K]. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. A very variable species, ranging from a thicket-forming shrub to a small tree in the wild[229]. It is occasionally cultivated for its edible fruit, there are several named varieties[183]. A stoloniferous species, spreading by suckers to form a thicket[11]. Hybridizes freely with other members of this genus[200]. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1]. Special Features:North American native, Blooms are very showy. The plant is heat tolerant in zones 8 through 3. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone, 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

5.2.13 Corylus maxima

Filbert, Giant filbert

4 tin 8 cyuc 5 kcaak 5 tcan 0 dwat m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikli-
wisslip hpa7tmwatli fyif hjonli

drutta *Corylus maxima* is a deciduous Shrub growing to 6 m (19ft) by 5 m (16ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to May, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Oil Oil SeedEdible Uses: Milk Oil OilSeed - raw or cooked[22, 34, 46, 105]. It is rich in oil. Large and well flavoured, it can be eaten raw, cooked in cakes, pies, breads etc or used to make a plant milk[183]. The seed ripens in mid to late autumn and will probably need to be protected from squirrels[K]. When kept in a cool place, and not shelled, the seed should store for at least 12 months[K]. An edible oil is obtained from the seed.

tcanta Basketry Charcoal Hedge Hedge Oil Oil WoodThe seed contains up to 65% of a non-drying oil, used in paints, cosmetics etc[13, 46, 57, 132]. The whole seed can be used to polish and oil wood[6]. Very easy and effective[K]. Plants can be grown as a tall hedge[29]. They need to be left untrimmed or only lightly trimmed if seed is required. Wood - soft, easy to split, not very durable, beautifully veined. Used for inlay work, small items of furniture, hurdles, wattles, basketry, pea sticks etc[7, 13, 23, 46, 61, 63, 66, 125]. The twigs are

as dowsing rods by water diviners[11]. The wood also yields a good quality charcoal, used by artists[63, 101].

nrakta S. Europe to W. Asia. ksacta Woods, hedges and ravines[100].

propta Seed - best sown as soon as it is harvested in autumn in a cold frame[164]. Germinates in late winter or spring. Stored seed should be pre-soaked in warm water for 48 hours and then given 2 weeks warm followed by 3 - 4 months cold stratification[164]. Germinates in 1 - 6 months at 20°C[164]. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame or sheltered place outdoors for their first winter. Plant them out into their permanent positions in late spring or early summer[K]. Layering in autumn. Easy, it takes about 6 months[78, 200]. Division of suckers in early spring. Very easy, they can be planted out straight into their permanent positions.

nwatta Management: Coppice Management: Standard Regional Crop Staple Crop: Protein-oilAn easily grown plant, it succeeds in most soils, but is in general more productive of seeds when grown on soils of moderate fertility[11, 200]. It does less well in rich heavy soils or poor ones[11, 63]. Does well in a loamy soil[11]. Very suitable for an alkaline soil[11], but it dislikes very acid soils[17]. Plants are fairly wild tolerant[1, 11]. A very hardy plant but the male flowers can be damaged by heavy frosts at flowering time[200]. The filbert is often cultivated for its edible seeds[50], there are many named varieties[63]. It has often been hybridized with *C. avellana* in breeding programmes[11]. Plants are self-fertile but a more certain crop is obtained if more than one cultivar is grown[200]. The main difference between cob nuts and filberts is that the husk of a filbert is longer than the seed and often completely encloses it, whilst the husk on a cob nut is shorter than the seed[200]. Squirrels are a major pest of this plant, often decimating the crop of nuts[200]. Members of this genus bear transplanting well and can be easily moved even when relatively large[11].

5.2.14 Dioscorea batatas

Chinese Yam

4 tlin 11 cyuc 5 kcak 3 tcan 5 dwat 3 m hukc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli nyanhjen hjonli

drutta *Dioscorea batatas* is a PERENNIAL growing to 3 m (9ft) by 1.5 m (5ft). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from September to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Edible species of *Dioscorea* have opposite leaves whilst poisonous species have alternate leaves[174].

kcakta Edible Parts: Fruit RootEdible Uses: Tuber - cooked[1, 46, 61, 105]. A floury texture[27] with a very pleasant flavour that is rather like a potato[K]. The tubers can be boiled, baked, fried, mashed, grated and added to soups[183]. They store well and for a long time[27, 37] and can also be left in the ground and harvested as required in the winter[K]. This is a top quality root crop, very suitable for use as a staple food[K]. An arrowroot can be extracted from the root[46], though this is not as good at binding other foods as the starch from *D. japonica*[183]. The root contains about 20% starch. 75% water, 0.1% vitamin B1, 10 - 15 mg% vitamin C[174]. Fruit. A starchy flavour, it is said to be very good for the health[206]. We wonder if this report is referring to the tubercles[K]. We've heard the aerial tubers can be eaten and are very tasty. Carbon Farming - Staple Crop: basic starch.

dwatta Anthelmintic Antidote Contraceptive Digestive Miscellany Vitamin CThe Chinese yam, called Shan Yao in Chinese herbalism, is a sweet soothing herb that stimulates the stomach and spleen and has a tonic effect on the lungs and kidneys[238]. The tuber contains allantoin, a cell-proliferant that speeds the healing process[238]. The root is an ingredient of "The herb of eight ingredients", traditionally prescribed in Chinese herbalism to treat hyperthyroidism,

nephritis and diabetes[254]. The tuber is anthelmintic, digestive and gently tonic[116, 147, 218, 254]. It is used internally in the treatment of tiredness, weight loss, poor appetite, poor digestion, chronic diarrhoea, asthma, dry coughs, frequent or uncontrollable urination, diabetes and emotional instability[238]. It is applied externally to ulcers, boils and abscesses[218, 238]. The tubers are harvested in the autumn and can be used raw or baked[238]. The leaf juice is used to treat snakebites and scorpion stings[218]. The roots of most, if not all, members of this genus, contains diosgenin[222, 240]. This is widely used in modern medicine in order to manufacture progesterone and other steroid drugs. These are used as contraceptives and in the treatment of various disorders of the genitatory organs as well as in a host of other diseases such as asthma and arthritis[222].

nrakta Temperate E. Asia, though the exact range is not known. ksacta Found in an apparently wild situation in valleys and on the slopes of hills in China[147]. Prefers sunny slopes in the wild[254].

propta Seed - sow March to April in a sunny position in a warm greenhouse and only just cover. It germinates in 1 - 3 weeks at 20°C[175]. Prick out the seedlings as soon as they are large enough to handle and grow on in a greenhouse for their first year. Plant out in late spring as the plant comes into new growth. Basal stem cuttings in the summer[37]. Division in the dormant season, never when in growth[1]. The plant will often produce a number of shoots, the top 5 - 10 cm of the root below each shoot can be potted up to form a new plant whilst the lower part of the root can be eaten[K]. Tubercles (baby tubers) are formed in the leaf axils. These are harvested in late summer and early autumn when about the size of a pea and coming away easily from the plant. They should be potted up immediately in individual pots in an unheated greenhouse or cold frame, covering them with about 10mm of soil. Protect them from mice etc and keep the soil moist but not wet. They should come into growth in the spring, plant them out in early summer when in active growth[K].

nwatta Management: Standard Minor Global Crop Staple Crop: Basic StarchAn easily grown plant, succeeding in a fertile well-drained soil in a sunny position or light shade[27, 37, 200], though it is best in full sun[160]. Plants are hardy to at least -18°C[160]. This species of yam is much cultivated in China for its edible root which can be up to 1 metre long[1]. It has a great potential to be a commercial crop in Britain, though a satisfactory method of harvesting the root needs to be found[K]. Plants take 3 - 4 years to reach full maturity[160], though one year roots of well grown plants can weigh more than 500g. There are many cultivated forms with different root shapes in China and Japan[174]. The yam is a climbing plant that supports itself by twining around the branches of other plants[219]. It can be grown successfully into small bushes or, perhaps simpler when being grown as a root crop, it can be grown up a frame in a similar manner to growing runner beans[K]. Plants produce tubercles (small tubers that are formed in the leaf axils of the stems), and can be propagated by this means[K]. The small white flowers have a pleasant scent of cinnamon[219]. There is some confusion over the correct name for this species. One report says that *D. batatas* is an invalid name that is often erroneously applied to two distinct species *D. opposita* and *D. japonica*[218]. The Flora of China accepts *D. batatas* as a synonym for *D. polystachya*[266]. Dioecious. Male and female plants must be grown if seed is required. Carbon Farming - Cultivation: regional crop. Management: standard. The plant is heat tolerant in zones 10 through 6. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Growth habit is a single or multiple shooting vine from a crown [1-2]. Herbaceous. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.2.15 Phragmites australis

Common Reed, American common reed, Hybrid common reed, European common reed, Subtropical common reed
4 tlin 10 cyuc 5 kcaak 4 tcan 2 dwat 3.6 m hkuc
hmimhtut cyutli tucphja7nhs6s hwicli hrasjlutnyik hpa7tli
flatprikliwsslphsoms hpa7tmwatli xre7t hjonli
drutta Phragmites australis is a PERENNIAL growing to 3.6 m (11ft) by 3 m (9ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can grow in water. The plant can tolerate maritime exposure.

kcakta Edible Parts: Leaves Root Seed Shoots Stem
Edible Uses: Condiment Drink Sweetener
Root - raw or cooked like potatoes[2, 13, 74, 102, 106, 183]. It contains up to 15% sugar. The flavour and texture are best when the root is young and still growing[144]. It can be dried, ground coarsely and used as a porridge[12, 46, 62]. In Russia they are harvested and processed into starch[269]. Young shoots - raw or cooked[61, 62, 102, 179]. They are best if used before the leaves form, when they are really delicious[144]. They can be used like bamboo shoots[183]. The partly unfolded leaves can be used as a potherb and the Japanese dry young leaves, grind them into a powder and mix them with cereal flour when making dumplings[183]. The stems are reported to contain 4.8 g protein, 0.8 g fat, 90.0 g total carbohydrate, 41.2 g fiber, and 4.4 g ash[269]. Seed - raw or cooked[257]. It can be ground into a powder and used as a flour[57, 62, 102, 106]. The seed is rather small and difficult to remove from the husk but it is said to be very nutritious[183]. A sugar is extracted from the stalks or wounded stems[2, 5, 62, 95]. A sweet liquorice-like taste[95], it can be eaten raw or cooked[62]. The stems can be boiled in water and then the water boiled off in order to obtain the sugar[178]. A sugary gum that exudes from the stems can be rolled into balls and eaten as sweets[183]. A powder extracted from the dried stems can be moistened and roasted like marshmallow[62, 95, 102, 183].

tcanta Alcohol Basketry Biomass Broom Cork Dye Fencing Fertilizer Fibre Fodder Fuel Furniture Green manure Insulation Miscellany Paper Pencil Soil stabilization String Teeth Thatching Weaving
The common reed can provide a large quantity of biomass and this is used in a wide variety of ways as listed below. Annual yields of 40 - 63 tonnes per hectare have been reported[269]. The plant is also converted into alcohol (for use as a fuel), is burnt as a fuel and is made into fertilizer[238]. The plant is rich in pentosans and may be used for the production of furfural - the nodes and sheaths yield 6.6% whilst the underground parts over 13% of furfural[269]. The pentosan content increases throughout the growing period and is maximum in the mature reed[269]. The reed can be used also for the preparation of absolute alcohol, feed yeast and lactic acid[269]. The stems are useful in the production of homogeneous boards[269]. They can also be processed into a fine fibrous material suitable as a filler in upholstery[269]. The stems have many uses. They are used for thatching roofs[1, 46, 74, 106]. It can last for 100 years[169]. The stems and leaves are also used for building dwellings, lattices, fences, arrows by Indians, and for weaving mats, carrying nets, basket making, insulation, fuel, as a cork substitute etc[13, 74, 99, 102, 115, 257, 269]. The stem contains over 50 percent cellulose and is useful in the manufacture of pulps for rayon and paper[269]. The fibre from the leaves and stems is used for making paper[189]. The fibre is 0.8 - 3.0 mm long and 5.0 - 30.5µm in diameter. The stems and leaves are harvested in the summer, cut into usable pieces and soaked for 24 hours in clear water. They are then cooked for 2 hours with lye and beaten in a blender. The fibre makes a khaki paper[189]. A fibre obtained from the plant is used for making string[95, 106]. The flowering stalks yield a fibre suitable for rope making[269]. The leaves are used in basket making and for weaving mats etc[169, 238]. A light green dye is obtained from the flowers[6, 115]. Freshly cut shoots are a good green manure[74] (Does this man as a soil mulch?[K]). The inflorescences are used as brooms[74].

The plant can be used as a cork substitute[74]. No further details. The plant is mixed with mud to make a plaster for walls[145]. Pens for writing on parchment were cut and fashioned from the thin stems of this reed[269], whilst the stems were also used as a linear measuring device[269]. The plant has a very vigorous and running rootstock, it is useful for binding the soil along the sides of streams etc[115]. It is planted for flood control since it stabilizes the banks and gradually builds up soil depth, thus raising the level of the bank.

dwatta Antiasthmatic Antidiarrhoeal Antidote Antiemetic Antipyretic Antitussive Cholera Depurative Diuretic Febrifuge Febrifuge Lithotropic Miscellany Odontalgic Refrigerant Sedative Sialogogue Skin Stomachic Styptic Urinary
The leaves are used in the treatment of bronchitis and cholera, the ash of the leaves is applied to foul sores[218]. A decoction of the flowers is used in the treatment of cholera and food poisoning[218]. The ashes are styptic[218]. The stem is antidote, antiemetic, antipyretic and refrigerant[218]. The root is antiasthmatic, antiemetic, antipyretic, antitussive, depurative, diuretic, febrifuge, lithotropic, sedative, sialogogue and stomachic[147, 176, 218, 238]. It is taken internally in the treatment of diarrhoea, fevers, vomiting, coughs with thick dark phlegm, lung abscesses, urinary tract infections and food poisoning (especially from sea foods)[238, 257]. Externally, it is mixed with gypsum and used to treat halitosis and toothache[238]. The root is harvested in the autumn and juiced or dried for use in decoctions[238].

nrakta Cosmopolitan, in most regions of the world, including Britain, but absent from the Amazon Basin. ksacta Shallow water and wet soil, avoiding extremely poor soils and very acid habitats[17].

propta Seed - surface sow in spring in a light position. Keep the soil moist by emmersing the pot in 3cm of water. Germination usually takes place quite quickly. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. Division in spring. Very simple, any part of the root that has a growth bud will grow into a new plant. Larger divisions can be planted out direct into their permanent positions. We have found that it is better to pot up the smaller divisions and grow them on in light shade in a cold frame until they are well established before planting them out in late spring or early summer.

nwatta Fodder: Bank Industrial Crop: Biomass Minor Global Crop
A very easily grown plant that thrives in deep moisture retentive soils such as marshes and swamps, whilst it also grows well along the sides of streams, lakes and ponds, in shallow water, ditches and wet wastelands[162, 200, 269]. Plants are tolerant of moderately saline water[169, 269]. The plant is reported to tolerate an annual precipitation in the range of 31 to 241cm, an annual temperature in the range of 6.6 to 26.6°C and a pH of 4.8 to 8.2[269]. Plants are hardy to about -20°C[200]. This species is very fast growing with a very vigorous and invasive running rootstock that can be 10 metres or more long, it can form very large stands in wetlands[200, 238, 260]. Difficult to eradicate once established, it is unsuitable for planting into small spaces[200, 238, 269]. The flowering heads are often used in dried flower arrangements[238]. There are some named forms, selected for their ornamental value[238].

5.2.16 Crataegus missouriensis

4 tlin 8 cyuc 5 kcaak 0 tcan 2 dwat m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrp hpa7tli
flatprikliwss hpa7tmwatli xre7t hjonli

drutta Crataegus missouriensis is a deciduous Tree growing to 6 m (19ft 8in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit
Edible Uses: Fruit - raw or cooked. The size of a large cherry, the flesh is sweet, soft and fairly juicy[K]. The fruit is only about 10mm thick according to another report[235]. The fruit ripens in mid to

late September in southern Britain[K], it makes a delicious dessert fruit and can also be used in making pies, preserves etc[K]. The fruit can be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta South-eastern N. America - Virginia to North Carolina and Missouri. ksacta Rocky bluffs and river banks[235].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. This species has a good potential as a fruit crop in Britain. It regularly produces heavy crops of high quality, the tree is very easily grown and is little troubled by pests or diseases. It also requires very little attention, once the trees are established virtually the only work needed is to harvest the fruit each year[K]. A plant growing at Hillier Arboretum was about 3 metres tall (with a trunk 2 metres long) and 3 metres wide, it was fruiting well in 1993 and 1994[K]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

5.2.17 *Allium canadense mobilense*

Canadian Garlic

4 tlin 8 cyuc 5 kcaak 0 tcan 2 dwat m hkuc
hmimhtut cyutli tcuphja7n hwicli hrasjlut hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta *Allium canadense mobilense* is a BULB growing to 0.5 m (1ft 8in) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees,

insects. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Bulb - raw or cooked[46, 61, 62, 177]. It can be used as a vegetable, or as a flavouring in soups and stews, and can also be pickled[2]. The bulb is up to 30mm in diameter, it is crisp, mild and with a pleasant flavour[183]. Used as a leek substitute according to one report[22], it is a garlic substitute according to others[55, 159, K]. Leaves - raw or cooked[55, 62, 177]. A delicious mild flavour, they are available from early spring until the autumn[K]. They make a very acceptable salad and can also be used as a greens or as a flavouring in cooked foods[K]. Flowers - raw. A little bit stronger flavour than the leaves, especially as the seeds begin to form, they can be used as a flavouring and garnish on salads[K].

tcanta Repellent The juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20].

dwatta Antiasthmatic Carminative Cathartic Diuretic Expectorant Stimulant The plant is antiasthmatic, carminative, cathartic, diuretic, expectorant and stimulant[257]. A tincture is used to prevent worms and colic in children, and also as a remedy for croup[257]. Although no other specific mention of medicinal uses has been seen for this species, members of this genus are in general very healthy additions to the diet. They contain sulphur compounds (which give them their onion flavour) and when added to the diet on a regular basis they help reduce blood cholesterol levels, act as a tonic to the digestive system and also tonify the circulatory system[K].

nrakta Southeaster N. America - Texas to North Carolina. ksacta Low woods, thickets and meadows[43]. Woods and prairies in sandy or rocky soils, rarely on limestone or clay[274].

propta Seed - sow spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle - if you want to produce clumps more quickly then put three plants in each pot. Grow them on in the greenhouse for at least their first winter and plant them out into their permanent positions in spring once they are growing vigorously and are large enough. Division in spring. Very easy, the plants divide successfully at any time in the growing season and the divisions can be planted straight out into their permanent positions if required.

nwatta Prefers a sunny position in a light well-drained soil[1]. A moisture loving plant according to another report[42]. The bulbs should be planted fairly deeply[1]. Bulbs grow to a good size under cultivation[183]. Some forms of this species produce many bulbils and are considered to be a pernicious weed in some areas of America[159], there is some risk that they could spread aggressively in Britain. This subspecies, however, is a form that does not produce bulbils and is much better behaved[200]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233].

5.2.18 *Amelanchier confusa*

4 tlin 8 cyuc 5 kcaak 0 tcan 0 dwat 3 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfril hpa7tli flatprik
hpa7tmwatli fyifxre7t hjonli

drutta *Amelanchier confusa* is a deciduous Shrub growing to 3 m (9ft) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: FruitEdible Uses: We have no records for this species, but the fruit is almost certainly edible both raw and cooked[K]. It is 7 - 9mm in diameter[200]. The fruit is rich in iron and copper[226].

nrakta Europe - S. Sweden. ksakta This species is only known from plants naturalised in Sweden, its origin is uncertain[11, 200].

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nwatta Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not too dry or water-logged[11]. Grows well in heavy clay soils. Prefers an acid or neutral soil. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible ornamentals. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. A suckering plant, the suckers are formed very close to the original stem so the plant forms a gradually expanding clump[K]. Plants growing at Hilliers Arboretum in Hampshire were 4 metres tall in early April 1999, they were suckering quite freely in a tight clump and flowering very freely[K]. This species is closely related to *A. laevis*[11]. Hybridizes freely with other members of this genus[200]. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1].

5.2.19 Hemerocallis middendorffii esculenta

4 tlin 8 cyuc 5 kcaak 0 tcan 1 dwat m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfrp hpa7tli flat-prikhwis hpa7tmwatli xre7t hjonli

drutta Hemerocallis middendorffii esculenta is a PERENNIAL growing to 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

ksakta Edible Parts: Flowers LeavesEdible Uses: Leaves and young shoots - cooked[105, 116, 177, 183]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 127, 177, 183]. The flowers are crisp and succulent with a delicious sweet flavour and no aftertaste[K]. The flowers can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205]. Plants form a spreading clump and are suitable for ground cover when spaced about 45cm apart each way[208]. The dead leaves should be left on the ground in the winter to ensure effective

coverage[208]. (This report was for a plant labelled H. middendorffiana, which I have assumed is a mis-spelling of this species[K])

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China, Japan ksakta Meadows in high mountains, N. and C. Japan[58, 205]. Forests, forest margins, grassy slopes, stony places and roadsides at elevations of 500 - 2500 metres in China[266].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. Individual flowers only live for one day[205]. Plants take a year or two to become established after being moved but then form large clumps[200, 187]. The roots are fibrous without any obvious swellings[205]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

5.2.20 Hemerocallis middendorffii

Amur daylily, Middendorf, Daylily
4 tlin 8 cyuc 5 kcaak 2 tcan 1 dwat m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfrp hpa7tli flat-prikhwis hpa7tmwatli xre7t hjonli

drutta Hemerocallis middendorffii is a PERENNIAL growing to 0.9 m (3ft) by 0.5 m (1ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

ksakta Edible Parts: Flowers Leaves ShootsEdible Uses: Leaves and young shoots - cooked[105, 116, 177, 183]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177, 183]. The flowers can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205]. Plants form a spreading clump and are suitable for ground cover when spaced about 45cm apart each way[208]. The dead leaves should be left on the ground in the winter to ensure effective cover[208]. (This report was for a plant labelled H. middendorffiana, which I have assumed is a mis-spelling of this species[K]). Attractive flowers.

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China, Japan, Korea. ksakta Meadows in high mountains of N. Japan[58]. Forests, forest margins, meadows and wet grasslands from near sea level to 2000 metres in China[266].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick

into the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Landscape Uses:Border, Container, Ground cover, Massing, Seashore. Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. Individual flowers are short-lived, but the plant produces a succession of blooms and also flowers again in late summer[205]. The plant has a fibrous root system that does not extend far[205]. Plants take a year or two to become established after being moved but then form large clumps[200, 187]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. Special Features: Attractive foliage, Not North American native, Naturalizing, Attracts butterflies, Suitable for cut flowers, Fragrant flowers.

5.2.21 *Rubus phoenicolasius*

Japanese Wineberry, Wine raspberry
4 tlin 8 cyuc 5 kcaak 1 tcan 0 dwat 3 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Rubus phoenicolasius* is a deciduous Shrub growing to 3 m (9ft) by 1 m (3ft 3in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[1, 2, 3, 34]. Sweet and juicy[11]. A raspberry-type fruit, it is smaller than a raspberry, contains rather a lot of seeds and is not quite such a flavourful fruit, but it makes very nice eating all the same[K]. After flowering, the fruit is enclosed in its calyx until just before it is ripe, this prevents maggots etc getting into the fruit[K]. The fruit is about 20mm in diameter[200].

tcanta DyeA purple to dull blue dye is obtained from the fruit[168].

nrakta E. Asia - N. China, Japan, Korea. Occasionally naturalized in Britain[17]. ksacta Waste places and clearings in lowland and mountains all over Japan[58]. Roadsides and montane valleys at low to medium elevations in China[266].

propta Seed - requires stratification, is best sown in early autumn in a cold frame. Sow stored seed as early as possible in the year in a cold frame and stratify for a month at 3°C if sowing later than February. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Tip layering in July. Plant out in autumn. Division in early spring.

nwatta Easily grown in a good well-drained loamy soil in sun or semi-shade[1, 11, 200], preferring light shade[202]. Plants are not too happy when grown in windy situations[K]. Hardy to about -18°C[202]. Some damage may be caused at this temperature but plants usually recover well[202]. A very ornamental plant, its red stems adding colour to the winter garden[1], it is sometimes cultivated for its edible fruit[1, 61]. There is at least one named variety, 'Bella di Tokyo' has small tasty red fruits[183]. This species is a raspberry with biennial stems, it produces a number of new stems each year from the perennial rootstock, these stems fruit in their second year and then die[200]. Plants in this genus are notably susceptible to honey fungus[200]. In garden design, as well

as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out. The root pattern is suckering with new plants from underground runners away from the plant [2-1].

5.2.22 *Rubus laciniatus*

Oregon Cut-Leaf Blackberry, Cutleaf blackberry
4 tlin 8 cyuc 5 kcaak 1 tcan 0 dwat 2.5 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Rubus laciniatus* is a deciduous Shrub growing to 2.5 m (8ft 2in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects, Apomictic (reproduce by seeds formed without sexual fusion). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[3, 34, 101, 257]. Large sweet and juicy with a fine flavour[11, 183]. The fruit is about 20mm in diameter[200]. tcanta DyeA purple to dull blue dye is obtained from the fruit[168].

nrakta The origin of this plant is uncertain. ksacta Not known in a truly wild situation.

propta Seed - requires stratification and is best sown in early autumn in a cold frame. Stored seed requires one month stratification at about 3°C and is best sown as early as possible in the year. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Cuttings of half-ripe wood, July/August in a frame[200]. Tip layering in July. Plant out in autumn. Division in early spring or just before leaf-fall in the autumn[200].

nwatta Easily grown in a good well-drained loamy soil in sun or semi-shade[1, 11, 200]. This species is a blackberry with biennial stems, it produces a number of new stems each year from the perennial rootstock, these stems fruit in their second year and then die[200]. The plant produces apomictic flowers, these produce fruit and viable seed without fertilization, each seedling is a genetic copy of the parent[200]. Sometimes cultivated for its edible fruit, it is a very vigorous and productive plant[3]. There is at least one named variety. 'Oregon Cutleaf Thornless' is high yielding with good flavoured fruits and no prickles on the stems, thus making it easier to harvest[17]. Plants in this genus are notably susceptible to honey fungus[200].

5.2.23 *Chenopodium* spp.

Perennial quinoa

4 tlin 10 cyuc 5 kcaak 2 tcan 3 dwat 2 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasljutnyik hpa7tli frus-
flatprikwlissliphsom hpa7tmwatli hjonli

drutta *Chenopodium* spp. is a PERENNIAL growing to 2 m (6ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid, very alkaline and saline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista The leaves and seeds of all members of this genus are more or less edible. However, many of the species in this genus contain saponins, though usually in quantities too small to do any harm. Although toxic, saponins are poorly absorbed by the body and most pass straight through without any problem. They are also broken down to a large extent in the cooking process. Saponins are found in many foods, such as some beans. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally

ing to get rid of the chaff. Carbon Farming Solutions - Cultivation: hypothetical. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

5.2.24 *Rubus idaeus*

Raspberry, American red raspberry, Grayleaf red raspberry
4 tlin 8 cyuc 5 kcac 3 tcan 3 dwat 2 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli fyifxre7t hjonli

plant in their diet since it can aggravate their condition[238].
kcka Edible Parts: Leaves SeedEdible Uses: Edible portion: Leaves, Seeds, Vegetable. Seed - cooked[1, 2, 4, 27, 57, 97]. A pleasant mild flavour, the seed can absorb the flavour of other foods that are cooked with it and so it can be used in a wide variety of ways[K]. The protein is good quality because of its amino acid balance. It has 2-6% more protein and better amino acid balance than wheat. It should be thoroughly soaked and rinsed to remove a coating of saponins on the seed surface. The seed can be used in all the ways that rice is used, as a savoury or sweet dish. It can also be ground into a powder and used as a porridge[37, 183]. The seed can also be sprouted and used in salads[183] though many people find the sprouted seed unpleasant[K]. The seed contains a very high quality protein that is rich in the amino acids lysine, methionine and cystine, it has the same biological value as milk[196]. The seed contains about 38% carbohydrate, 19% protein, 5% fat, 5% sugar[171]. Leaves - raw or cooked[2, 4, 37, 57]. The young leaves are cooked like spinach[183]. It is best not to eat large quantities of the raw leaves, see the notes above on toxicity.

caanta Gold/green dyes can be obtained from the whole plant[168]. Saponins on the seed can be used as a bird and insect deterrent by spraying them on growing plants[141]. The saponins are obtained by saving the soak-water used when preparing the seed for eating. The spray remains effective for a few weeks or until washed off by rain[K].

dwatta Some medical properties. See individual plants for example: Chenopodium album, Chenopodium ambrosioides, Chenopodium ambrosioides anthelminticum

nrakta Chenopodium is a genus of numerous species of perennial or annual herbaceous flowering plants known as the goosefoots, which occur almost anywhere in the world including Africa, Australasia, North America, Europe, and Oceania, (even, apparently in Antarctica). ksacta Varied depending on species.

propta Seed - sow April in situ. The seed can either be sown broadcast or in rows about 25cm apart, thinning the plants to about every 10cm. Germination is rapid, even in fairly dry conditions. Be careful not to weed out the seedlings because they look very similar to some common garden weeds[K].

nwatta Hypothetical Crop Management: StandardClimate: cold temperate to subtropical, tropical highlands. Humidity: humid. A cultivated food crop. A plant of higher elevations in the tropics, it has also been successfully grown in the temperate and subtropical zones. Plants tolerate light frosts at any stage in their development except when flowering[57, 196]. An easily grown plant, it requires a rich moist well-drained soil and a warm position if it is to do really well, but it also succeeds in less than optimum conditions[27, 37]. Tolerates a pH range from 6 to 8.5 and moderate soil salinity[196]. Plants are quite wind resistant[K]. Plants are drought tolerant once they are established[196]. The plant is day-length sensitive and many varieties fail to flower properly away from equatorial regions, however those varieties coming from the south of its range in Chile are more likely to do well in Britain[196]. Different cultivars take from 90 - 220 days from seed sowing to harvest[196]. Yields as high as 5 tonnes per hectare have been recorded in the Andes, which compares favourably with wheat in that area[196]. Young plants look remarkably like the common garden weed fat hen (Chenopodium album). Be careful not to weed the seedlings out in error[K]. The seed is not attacked by birds because it has a coating of bitter tasting saponins[141, K]. These saponins are very easily removed by soaking the seed overnight and then thoroughly rinsing it until there is no sign of any soapiness in the water. The seed itself is very easy to harvest by hand on a small scale and is usually ripe in August.

Cut down the plants when the first ripe seeds are falling easily from the flower head, lay out the stems on a sheet in a warm dry position for a few days and then simply beat the stems against a wall or some other surface, the seed will fall out easily if it is fully ripe and then merely requires winnow-

ing to get rid of the chaff. Carbon Farming Solutions - Cultivation: hypothetical. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

drutta *Rubus idaeus* is a deciduous Shrub growing to 2 m (6ft) by 1.5 m (5ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in leaf from April to November, in flower from June to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcka Edible Parts: Fruit Root Shoots StemEdible Uses: Coffee TeaFruit - raw or cooked[2, 5, 7, 61]. Delicious when eaten out of hand, the fruit is also used in pies, preserves etc[183]. Root - cooked. The root, which should be neither too young nor too old, requires a lot of boiling[7]. Young shoots - peeled and eaten raw or cooked like asparagus[172]. They are harvested as they emerge through the ground in the spring and whilst they are still tender. A herb tea is made from the dried leaves[21, 46, 183]. Another report says that a type of tea made from raspberry and blackberry leaves is an excellent coffee substitute[7].

tcanta Cosmetic Dye PaperLandscape Uses:Erosion control, Foundation, Ground cover, Massing, Rock garden, Seashore. ts in this genus are notably susceptible to honey fungus[200]. Special Features: Not North American native, Attracts butterflies, Inconspicuous flowers or blooms. A purple to dull blue dye is obtained from the fruit[168]. A fibre obtained from the stems is used in making paper[189]. The stems are harvested in the summer after the fruit has been eaten, the leaves are removed and the stems are steamed until the fibres can be stripped. The fibres are cooked for 2 hours with lye and then hand beaten with mallets or ball milled for 3 hours. The paper is light brown in colour[189]. A decongestant face-mask made from the fruit is used cosmetically to soothe the reddened skin[7].

dwatta Antiinflammatory Astringent Birthing aid Cardiac Decongestant OxytotoxicAntiemetic[13, 165]. The leaves and roots are anti-inflammatory, astringent, decongestant, opthalmic, oxytotoxic and stimulant[4, 13, 165, 222, 254]. A tea made from them is used in the treatment of diarrhoea, as a tonic for the uterus to strengthen pregnant women, and as an aid in childbirth[4, 222, 257]. The tea has also been shown as effective in relieving painful menstrual cramps[222]. The active ingredients both stimulate and relax the uterus[222]. They can be used during the last three months of pregnancy and during childbirth, but should not be used earlier[238]. Externally, the leaves and roots are used as a gargle to treat tonsillitis and mouth inflammations, as a poultice and wash to treat sores, conjunctivitis, minor wounds, burns and varicose ulcers[238, 257]. The leaves are harvested in the summer and dried for later use[9]. The fruit is antiscorbutic and diuretic[7]. Fresh raspberry juice, mixed with a little honey, makes an excellent refrigerant beverage to be taken in the heat of a fever[21]. Made into a syrup, it is said to have a beneficial effect on the heart[21].

nrakta Europe, including Britain, from Iceland south and east to Spain and temperate Asia. ksacta Moist neglected land, hedgerows and woodland edges[7, 11, 244].

propta Seed - requires stratification and is best sown in early autumn in a cold frame. Stored seed requires one month stratification at about 3°C and is best sown as early as possible in the year. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Cuttings of half-ripe wood, July/August in a frame[200]. Tip layering in July. Plant out in autumn. Division in early spring or just before leaf-fall in the autumn[200].

nwatta Prefers a good deep well-drained loamy soil on the acid side[1, 34]. Dislikes very heavy soils[1, 200], light

soils[4] and alkaline soils[200]. Prefers an open position but tolerates some shade[1]. Plants crop less well when grown in the shade of trees though they do well in the open on a north-facing slope[200]. Requires a position sheltered from strong winds[200]. Prefers a pH between 6 and 6.5[200]. Raspberries are frequently cultivated in temperate regions of the world, both in the garden and commercially, for their edible fruit. There are many named varieties able to supply fresh fruit from mid-summer to the autumn[1, 200]. High costs of picking the fruit means that little is actually sold fresh, most of the commercially cultivated crops either being used for preserves or grown for the 'Pick Your Own' trade. All the cultivars are self-fertile[200]. This species has biennial stems, it produces a number of new stems each year from the perennial rootstock, these stems fruit in their second year and then die[200]. It is best not to grow raspberries near blackberries or potatoes[18]. PlanFor polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2]. Heat zone: 9-1.

5.2.25 Amelanchier stolonifera

Quebec Berry, Running serviceberry
4 tlin 8 cyuc 5 kcaak 0 tcan 1 dwat 1.5 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli frusflatprik hpa7tmwatli fyfjxre7t hjonli

drutta Amelanchier stolonifera is a deciduous Shrub growing to 1.5 m (5ft). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in May, and the seeds ripen in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: FruitEdible Uses: Edible fruit - raw or cooked[3, 101, 105]. Sweet and juicy with a good flavour that has a hint of apple[1, 11, 183, K]. The plant usually yields very well in Britain and the well-flavoured fruit means that it has excellent potential as a commercial crop[K] The fruit is rich in iron and copper[226].

dwatta TonicThe root bark has been used as a tonic[257].

nrakta Eastern N. America ksacta Dry acid rocky or sandy open habitats[43].

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nwatta Dislikes calcareous soils[11]. Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not too water-logged[11]. Grows well in heavy clay soils. Tolerates dry soils[200]. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible ornamentals. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. Produces suckers quite freely,

the plant forms thickets. When propagated by these suckers, the new plants can begin producing a crop of fruit in their second year[K]. The sub-species *A. stolonifera* micropetala was seen growing in dappled shade at Hilliers Arboretum in early April 1999. It was about 2 metres tall, suckering freely with some suckers more than 50cm from the parent plant, and flowering freely[K]. Hybridizes with *A. arborea*, *A. bartramiana*, *A. laevis* and *A. sanguinea*. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1]. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

5.2.26 Ribes nigrum

Blackcurrant, European black currant

4 tlin 8 cyuc 5 kcaak 2 tcan 3 dwat 1.8 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis hpa7tmwatli fyfjxre7t hjonli

drutta Ribes nigrum is a deciduous Shrub growing to 1.8 m (6ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from March to November, in flower from April to May, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit LeavesEdible Uses: TeaFruit - raw or cooked. An excellent aromatic flavour[K]. The fully ripe fruit is very acceptable raw, though it is more often cooked and used to make pies, jams etc[1, 2, 5, 9, 34]. Very rich in vitamin C[244]. The fruit is about 10mm in diameter[200], though selected cultivars have larger fruits[K]. The leaves are used in soups[183]. The dried leaves are a tea substitute[74, 177, 183]. They are sometimes added to blended herb teas[238].

tcanta Cosmetic Dye Miscellany PreservativeThe oil from the seed is added to skin preparations and cosmetics. It is often combined with vitamin E to prevent oxidation[238]. A yellow dye is obtained from the leaves[100]. A blue or violet dye is obtained from the fruit[100]. The leaves are used for vegetable preservation[74]. No more details.

dwatta Antidiarrhoeal Antirheumatic Diaphoretic Diuretic Febrifuge Miscellany Vitamin CBlackcurrant fruits are a good source of minerals and vitamins, especially vitamin C. They have diuretic and diaphoretic actions, help to increase bodily resistance to infections and are a valuable remedy for treating colds and flu[4, 254]. The juice, especially when fresh or vacuum-sealed, helps to stem diarrhoea and calms indigestion[4, 254]. The leaves are cleansing, diaphoretic and diuretic[4, 9]. By encouraging the elimination of fluids they help to reduce blood volume and thereby lower blood pressure[254]. An infusion is used in the treatment of dropsy, rheumatic pain and whooping cough, and can also be used externally on slow-healing cuts and abscesses[9]. It can be used as a gargle for sore throats and mouth ulcers[254]. The leaves are harvested during the growing season and can be used fresh or dried[238]. It is believed that an infusion of the leaves increases the secretion of cortisol by the adrenal glands, and thus stimulates the activity of the sympathetic nervous system[254]. This action may prove useful in the treatment of stress-related conditions[254]. An infusion of the young roots is useful in the treatment of eruptive

Useful[4]. A decoction of the bark has been found of use in the treatment of calculus, dropsy and haemorrhoidal tumours[4]. The seed is a source of gamma-linolenic acid, an unsaturated fatty acid which assists the production of hormone-like substances[238]. This process is commonly blocked in the body, causing disorders that affect the uterine muscles, nervous system and metabolism[238]. We have no records of the oil from this species being used medicinally, though it is used in cosmetic preparations[238, K].

nrakta Europe, including Britain, from Scandinavia south and east to France, Bulgaria, N. and C. Asia. ksacta Hedges and woodlands, often by streams[9, 17].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 3 months cold stratification at between 0 and 5°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. Best grown on a deep sandy loam[1]. Dislikes very heavy clay, chalky soils and thin dry soils, but it can succeed on most soil types if plenty of organic matter is incorporated[1]. Plants require plenty of nitrogen if they are to do well[200]. Prefers a pH in the range 6.7 to 7 and is intolerant of acid soils[200]. Plants are quite tolerant of shade though do not fruit so well in such a position[11]. Plants fruit less freely when grown in windy sites[200]. The plant is hardy to about -20°C, though flowers are damaged at -1°C[200]. Blackcurrants are widely cultivated in temperate areas for their edible fruit, there are many named varieties[183, 200]. Most fruit is produced on one year old wood. Pruning usually consists of removing about a third of all the stems from just above ground level in the autumn. The oldest stems with least new growth are removed since these will be the poorest fruiterers. The plant is able to make new growth from the base of the removed stems and, if the plants are well fed, this growth is very vigorous and will fruit heavily the following year. The flowers can self-fertilize but many cultivars fruit better with insect pollination[200]. Plants can harbour a stage of 'white pine blister rust', so they should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching; a heart root, dividing from the crown into several primary roots going down and out. The root pattern is suckering with new plants from underground runners away from the plant [2-1].

5.2.27 *Daucus carota sativus*

Carrot
4 tlin 10 cyuc 5 kca4 4 tcan 3s dwat 1.2 m hkuc
thtuc cyuthi tcup htcan hrsljutnyik hpa7tli flatprikrlwis
hpa7tmwattli fyfxkre7t hjonli

drutta *Daucus carota sativus* is a BIENNIAL growing to 1.2 m (4ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Flies, beetles. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista Carrots sometimes cause allergic reactions in some people[46]. Skin contact with the sap is said to cause photo-sensitivity and/or dermatitis in some people[218].

kcakta Edible Parts: Leaves RootEdible Uses: Coffee Colouring CondimentRoot - raw or cooked[2, 7, 27]. The roots of well-grown plants are crisp, sweet and juicy, they are very nice raw and are also cooked as a vegetable or added to soups, stews etc[K]. The grated root is a tasty addition to the salad bowl[K]. The juice can be extracted from the root and used as a health-promoting drink[46]. The root is very rich in carotene, which is transformed by the body into vitamin A when it is eaten[7]. The root is sometimes ground into a powder and used in making cakes, bread etc[7, K]. The roasted root is a coffee substitute[21, 46]. Carotin, extracted from the roots, is used as an orange-yellow food dye[171]. Leaves - raw or cooked. A very strong flavour, they can be added in small quantities to mixed salads[K]. The leaves contain an oil that is rich in vitamin E, they are sometimes used as a flavouring in soups[7]. An essential oil from the seed is used as a food flavouring.

tcanta Alcohol Dye EssentialThe roots are fermented in order to produce alcohol[7]. An orange dye is obtained from the root[171]. An essential oil from the seed has a distinctive fragrance and is used in perfumery[7, 46].

dwatta Anthelmintic Carminative Deobstruent Diuretic Galactogogue Ophthalmic StimulantCultivated carrot roots are a rich source of beta-carotene, which is converted to vitamin A by the liver[254]. When used as a regular item in the diet the roots improve eyesight and skin health, and also have anti-cancer effects[238]. A wonderful cleansing medicine, it supports the liver and stimulates urine flow and the removal of waste by the kidneys[254]. The root is diuretic and ophthalmic[7]. The juice of organic carrots is a delicious drink and a valuable detoxifier[254]. The raw root, grated or mashed, is a safe treatment for threadworms, especially in children[254]. The seed is carminative, galactogogue, lithontripic and stimulant[7, 240]. They are useful in the treatment of kidney diseases, dropsy and to settle the digestive system[240, 254]. They stimulate menstruation and have been used in folk medicine as a treatment for hangovers[254].

nrakta A cultivated form of *D. carota*. ksacta Not known in the wild.

propta Seed - sow in situ in succession from early spring to early summer. Do not transplant the seedlings, since this will usually cause damage to the roots and a good crop will not be obtained. Carrot seed needs a well-made seed bed with a fine tilth if good germination is to be achieved. The earliest sowings can be made of an early maturing variety in a cold frame or greenhouse in January or February, this will provide edible roots in late spring. The first outdoor sowings are made as the soil warms up in the spring. Successional sowings can be made until early summer if required. A September sowing in mild areas can provide an early spring supply of young roots, though the plants will often require some protection.

nwatta Prefers a good light warm well-drained soil and plenty of moisture[16, 27, 37, 200]. Prefers a sandy or calcareous loam[132]. Plants are extremely sensitive to soil conditions, good roots can only be produced in a soil that permits easy penetration of the root[200]. Carrots are reported to tolerate an annual precipitation in the range of 31 to 410cm, an annual temperature range of 3.6 to 28.5°C and a pH of 4.2 to 8.7[269]. They prefer a pH in the range 6.5 to 7.5[200]. Carrots are widely cultivated in most areas of the world for their edible root, which can be available all year round from successional sowings[46]. There are many named varieties, with roots varying in size and shape from short and round to long and tapering[183, 200]. World-wide, the yields of roots averages about 24 tonnes per hectare, the world low production yield was 3,125 kg/ha in Zaire, whilst the world high production yield was 62,889 kg/ha in Belgium-Luxembourg[269]. Plants grow best at a mean temperature of 16 - 18°C. At temperatures above 28°C top growth is reduced and the roots become very strongly flavoured. At temperatures below 16°C the roots become long and tapered and are pale in colour[200]. The leaves are moderately susceptible to frost but the roots are much hardier and can safely be left in the ground in the winter in most areas[200], so long as pests such as slugs or root fly are not a problem[K]. If dug up for storage, the roots can be kept for up to six months at 0 - 1°C and high relative humidity[200]. Carrots are very susceptible to a number of pests and diseases. The young seedlings

are adored by slugs and will generally need some protection. Carrot root fly is also a major problem. This creature lays its eggs near the young carrots. When they hatch, the larvae burrow into the soil and then eat their way into the root. In bad seasons almost all the crop can be heavily damaged. It is possible to reduce this damage by timing seed sowing to try and avoid the worst times of infestation, a June sowing of a fast-maturing cultivar will often be successful. There are also various companion plants that can help to reduce infestation. In general, these are strong-smelling plants such as garlic, onions and various aromatic plants such as wormwood. The idea is that these plants will mask the smell of the carrots and therefore the fly, which mainly uses scent to find the plants, will not be able to detect the smell of the carrots. This method is most likely to fail when the fly comes close enough to the plants to see them and then no longer relies on scent. The most successful organic solution to date has been to erect barriers of clear polythene about 1 metre tall all around the bed of carrots. Since the fly generally flies below this height, it has proved to be quite effective, although any fly that does get in will then tend to stay inside the barrier and lay all of its eggs there. About 95% of carrot flowers are pollinated by insects, with the remaining 5% self-pollinating[269]. Carrots grow well with lettuce and chives[18] but dislike dill[20]. They also grow badly with potatoes, kohlrabi, fennel and cabbages[201]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fleshy. Thick or swollen - fibrous or tap root [2-1].

5.2.28 Allium cepa proliferum

Tree Onion, Walking Onion

4 tlin 8 cyuc 5 kcak 3 tcan 3 dwat 1.2 m hkuc
 htut cyutli tcup hwicli hrasjlut hpa7tli flatprikwlis
 hpa7tmwatli xre7t hjonli

drudda Allium cepa proliferum is a BULB growing to 1.2 m (4ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista There have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of this plant. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Leaves Root Edible Uses: The plant forms small bulbs at the top of the flowering stem, these can be eaten raw or cooked[16, 33]. They have a strong onion flavour and are often used as pickled onions or added to salads[K]. As long as the bulbs are dried properly at harvest time, they store well[4]. Bulb - raw or cooked. The bulb can be up to 4cm in diameter and has a strong onion flavour[K]. Chopped into slices, it makes a good addition to salads and can also be used as a vegetable or as a flavouring in cooked foods[K]. Leaves - raw or cooked. A strong onion flavour, it makes a nice flavouring in salads though it should not be harvested in quantity because this would reduce the yield of bulbs[K]. The leaves are produced from late autumn, though we have found that harvesting them at this time will often encourage diseases such as mildew[K].

tcanta Cosmetic Dye Hair Polish Repellent Rust The juice of the plant is used as a moth repellent and can also be rubbed onto the skin to repel insects[7]. The plant juice can be used as a rust preventative on metals and as a polish for copper and glass[7]. A yellow-brown dye is obtained from the skins of the bulbs[141, 168]. Onion juice rubbed into the skin is said to promote the growth of hair and to be a remedy for baldness[7]. It is also used as a cosmetic to get rid of freckles[7]. The growing plant is said to repel insects and moles[201]. A spray made by pouring enough boiling water to cover 1kg of chopped unpeeled onions is said to increase the resistance of other plants to diseases and parasites[201].

dwatta Anthelmintic Antiinflammatory Antiseptic Antispasmodic Carminative Diuretic Expectorant Febrifuge Hypoglycaemic Hypotensive Lithontripic Skin Stomachic Tonic Although rarely used specifically as a medicinal herb, the onion has a wide range of beneficial actions on the body and

when eaten (especially raw) on a regular basis will promote the general health of the body. The bulb is anthelmintic, anti-inflammatory, antiseptic, antispasmodic, carminative, diuretic, expectorant, febrifuge, hypoglycaemic, hypotensive, lithontripic, stomachic and tonic[4, 7, 21]. When used regularly in the diet it offsets tendencies towards angina, arteriosclerosis and heart attack[254]. It is also useful in preventing oral infection and tooth decay[254]. Baked onions can be used as a poultice to remove pus from sores[254]. Fresh onion juice is a very useful first aid treatment for bee and wasp stings, bites, grazes or fungal skin complaints[7, 201]. When warmed the juice can be dropped into the ear to treat earache[254]. It also aids the formation of scar tissue on wounds, thus speeding up the healing process, and has been used as a cosmetic to remove freckles[7].

nrakta Original habitat is obscure. ksacta Not known in the wild.

propta Harvest bulbs in late summer and replant immediately or store them in a cool dry frost-free place and plant them out in late winter or early spring. Division of the bulbs after the leaves die down in late summer.

nwatta Prefers a sunny position in a light well-drained soil[1] but succeeds in most soils that are in good condition[16]. Tolerates a pH in the range 4.5 to 8.3. The bulbs should be planted fairly deeply[1]. Some modern works have moved this plant from *A. cepa*, seeing it as being of hybrid origin with *A. fistulosum* and therefore renaming in *A. x proliferum*. The tree onion is a genuinely perennial form of *A. cepa* that is sometimes grown in the herb garden for its edible bulbs. Plants rarely if ever produce seed, instead the flowering head is comprised of a number of small onions or bulbs[16, 33]. Plants are propagated by means of these bulbs or by dividing the main bulb that grows underground[K]. By no means a heavily productive plant, though the bulbs are very well flavoured and the plant is fairly easily grown[K]. Its main problem is that slugs seem to be attracted to it and can eat to death even well-established plants[K]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Said to be immune to onion root fly[16]. Members of this genus are rarely if ever troubled by browsing deer[233]. The plant is heat tolerant in zones 12 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

5.2.29 Ribes uva

Gooseberry, European gooseberry

4 tlin 8 cyuc 5 kcak 2 tcan 1 dwat 1.2 m hkuc
 hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
 hpa7tmwatli fyifxre7t hjonli

drudda Ribes uva-crispa is a deciduous Shrub growing to 1.2 m (4ft) by 1 m (3ft 3in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from March to May, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The fresh leaves contain the toxin hydrogen cyanide, though details of quantities are not given[240]. This substance is found in several foods, including almonds. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to

of benefit to the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

ksakta Edible Parts: Fruit Leaves**Edible Uses:** Fruit - raw or cooked[1, 2, 5, 7, 61]. The fruit is often picked when under-ripe and very firm, it has a very tart flavour at this time and is mainly used in making pies, jams etc. However, if the fruit is allowed to remain on the plant until it is fully ripe and soft it becomes quite sweet and is delicious for eating out of hand[K]. The fruit of the wild species is often less than 1cm in diameter, but named cultivars have considerably larger fruits up to 3cm in diameter[K]. Leaves- raw. The young and tender leaves can be eaten in salads[4]. Some caution is advised, see the notes above on toxicity.

tcanta Cosmetic MiscellanyThe fruit pulp is used cosmetically in face-masks for its cleansing effect on greasy skins[7].

dwatta Astringent Dysentery Laxative MiscellanyThe fruit is laxative[7]. Stewed unripe gooseberries are used as a spring tonic to cleanse the system[4]. The leaves have been used in the treatment of gravel[4]. An infusion taken before the monthly periods is said to be a useful tonic for growing girls[4]. The leaves contain tannin and have been used as an astringent to treat dysentery and wounds[7].

nrakta Europe, including Britain, from Scandinavia south and east to N. Africa, Italy and the Caucasus. **ksacta Woods and hedges,** often by streams[17].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 3 months cold stratification at between 0 and 5°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. Growth is often poor in light soils, whilst heavy soils encourage soft growth and excess vigour[200]. Prefers a pH in the range 6 to 6.5[200], though it can grow well in more acid or alkaline soils[K]. It is important to add plenty of humus to chalky soil[K]. Plants are quite tolerant of shade though do not fruit so well in such a position[11]. They can be grown against east or north facing walls[37]. The fruit of plants on north facing walls will ripen later, thus extending the fruiting season, though yields will be lower[K]. Plants dislike very hot weather[37]. Dormant plants are hardy to about -20°C[200], but the flowers and young fruits are susceptible to frost damage. Plants are very susceptible to potash deficiency[1], especially when grown on alkaline soils[K]. Gooseberries are commonly cultivated in temperate regions for their edible fruit, there are many named varieties[183, 200]. Birds love the fruit and so some protection is often required, especially if the fruit is being grown to full ripeness[K]. Plants grow best in cool moist climates such as N. Europe[200]. Plants fruit best on one and two year old wood so any pruning should be to encourage vigorous new shoots[200]. Plants can harbour a stage of white pine blister rust, so should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 9 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

5.2.30 Malva alcea

Vervain mallow, Hollyhock Mallow
4 tin 8 cyuc 5 kcak 2 tcan 1 dwat 1.2 m hkuc
hmimhtut cyutli tcup hwicli hrasjltutnyik hpa7tli flatprikliws
hpa7tmwatli xre7t hjonli

drutta Malva alcea is a PERENNIAL growing to 1.2 m (4ft) by 0.8 m (2ft 7in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from July to October, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although we have seen no reports of toxicity for this species, when grown on nitrogen rich soils (and particularly when these are cultivated inorganically), the leaves of some species tend to concentrate high levels of nitrates in their leaves[76]. The leaves are perfectly wholesome at all other times.

ksakta Edible Parts: Flowers Leaves Oil Oil Seed**Edible Uses:** Oil OilLeaves - raw or cooked[74]. A mild pleasant flavour[K]. The leaves are mucilaginous and fairly bland, this is a very good perennial substitute for lettuce in a salad, producing fresh leaves from spring until the middle of summer, or until the autumn from self-sown plants[K]. Flowers - raw[K]. A very decorative addition to the salad bowl, they have a mild flavour and a texture similar to the leaves[K]. Seed - raw[74]. Best used before it is fully mature, the seed has a pleasant nutty taste but it is rather small and fiddly to harvest[K].

tcanta Dye Fibre Oil OilA fibre obtained from the stem is used for making cordage[74]. Cream, yellow and green dyes can be obtained from the plant and the seed heads[168]. The seed yields 15% oil[74]. The uses of this oil have not been given though it is almost certainly edible[K].

dwatta Demulcent MouthwashThe leaves are demulcent. They are also used as a mouthwash for inflammatory and catarrhal conditions[74].

nrakta Europe. An occasional casual in Britain. **ksacta Gardens, vineyards and waste places**[74].

propta Seed - best sown in early spring in a cold frame. The seed germinates quickly and easily. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in their permanent positions in the early summer[K]. If you have sufficient seed then it can be sown outdoors in situ in the middle to late spring. Basal cuttings in late spring. Harvest the shoots with plenty of underground stem when they are about 8 - 10cm above the ground. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer.

nwatta Landscape Uses:Border, Container, Massing. A very easily grown plant, succeeding in ordinary garden soil[1], though it prefers a reasonably well-drained and moderately fertile soil in a sunny position[200]. A very ornamental and polymorphic plant[1, 50]. It tends to be quite short-lived in cultivation but usually self-sows when well-sited[233, K]. It is closely related to *M. excisa*[74]. If the plant is cut back to the ground as it comes into flower, then it will produce a fresh flush of leaves for salads[K]. Plants seem to be immune to the predations of rabbits[233] and are seldom bothered by slugs[K]. Plants are prone to infestation by rust fungus[200]. **Special Features:** Not North American native, Naturalizing, Extended bloom season in Zones 9A and above. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2].

5.2.31 Allium tuberosum

Garlic Chives, Chinese chives, Oriental Chives,

4 tlin 8 cyuc 5 kcaak 3 tcan 2 dwat 0.3 m hkuc

htut cyutli hgatkuyctucp hwicli hrasjlutnyik hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

drutta Allium tuberosum is a BULB growing to 0.3 m (1ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 7 and is not frost tender. It is in flower from August to September, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in very large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves Oil RootEdible Uses: OilLeaves - raw or cooked[1, 15, 46, 52, 88]. A mild flavour, somewhat like a cross between garlic and chives[K], they are delicious in salads[183]. The flavour is destroyed by lengthy cooking[238]. The leaves are available from early spring until late in the autumn[K]. They contain about 2.6% protein, 0.6% fat, 2.4% carbohydrate, 0.95% ash. They also contain small amounts of vitamins A, B1 and C[179]. The rather small bulbs are about 10mm in diameter and are produced in clusters on a short rhizome[200]. Flowers and flower buds - raw or cooked[52, 88, 183]. A delicious flavouring and pretty garnish for the autumn salad bowl[K]. Root - raw or cooked. An edible oil is obtained from the seed[183].

tcanta Oil RepellentThe juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20].

dwatta Antibacterial Cardiac Digestive Stomachic Tonic UrinaryThe whole plant is antibacterial, cardiac, depurative, digestive, stimulant, stomachic and tonic[61, 174, 218]. It is an anti-emetic herb that improves kidney function[238]. It is used internally to treat urinary incontinence, kidney and bladder weaknesses etc[238]. The seed is carminative and stomachic[218]. They are used in India in the treatment of spermatorrhoea[240]. The leaves and the bulbs are applied to bites, cuts and wounds[218].

nrakta E. Asia? Original habitat is obscure. ksacta Not known in a truly wild situation.

propta Seed - sow spring in a cold frame. The seed has a fairly short viability and should not be used when more than 1 year old[206]. Prick out the seedlings into individual pots when they are large enough to handle - if you want to produce clumps more quickly then put three plants in each pot. Plant out in late summer if the plants have developed sufficiently, otherwise plant them out the following spring. Division in early spring. Very easy, the plants divide successfully at almost any time of the year. The divisions can be planted straight out into their permanent positions if required.

nwatta Landscape Uses:Border, Container, Ground cover, Rock garden. An easily grown plant[203], it prefers a sunny position in a rich moist but well-drained soil[1, 88]. Tolerates most soils[52, 88], including clay[203, 206]. Tolerant of dry soils, established plants also resist drought[190]. Tolerates some shade, even in N.W. England[203]. The roots penetrate up to 50cm into the soil[206]. Tolerates a pH in the range 5.2 to 8.3. This plant succeeds in temperate and tropical climates[90]. It appears to be fully hardy in Britain[90]. Plants tolerate 40 degrees of frost in Manchuria (the report does not say if this is fahrenheit or centigrade)[206]. Plants remain green until temperatures fall below 4 - 5°C, they come into new growth in spring when temperatures go above 2 - 3°C[206]. Often cultivated for its edible leaves and bulb in the Orient, there are many named varieties[90, 183]. There are two main types of cultivar, one is grown for its leaves and the other for its flowering stem[200, 206]. This species is being increasingly grown as a garden vegetable in Britain[K]. A very ornamental plant, it grows well as an edging plant in the flower garden[K]. Closely related to A. ramosum[203]. The bulbs should be planted fairly deeply[1]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is

a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. Special Features: Edible, Fragrant foliage, Not North American native, Invasive, Suitable for cut flowers, Suitable for dried flowers, Fragrant flowers. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

5.2.32 Allium schoenoprasum sibiricum

Giant Chives

4 tlin 8 cyuc 5 kcaak 2 tcan 2 dwat 0.3 m hkuc

hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikli-wis hpa7tmwatli xre7t hjonli

drutta Allium schoenoprasum sibiricum is a BULB growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in very large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves RootEdible Uses: Leaves - raw, cooked or dried for later use. The leaves have a mild onion flavour and are an excellent addition to mixed salads, they can also be used as a flavouring in soups etc[90, 105]. This form has a stronger garlic flavour than common chives[183] The leaves are often available from late winter and can continue to produce leaves until early the following winter, especially if the plant is in a warm, sheltered position[K]. A good source of sulphur and iron[201]. The bulbs are rather small but can be used as spring onions[K]. They can be harvested with the leaves still attached and be used as spring onions[K]. They have a pleasant mild onion flavour. The flowers can be used as a garnish in salads etc[183]. The flowers of this species are rather dry and less desirable than the flowers of many other species[K].

tcanta Fungicide RepellentThe juice of the plant is used as an insect repellent, it also has fungicidal properties and is effective against scab, mildew etc[14, 18, 20]. The growing plant is said to repel insects and moles[14, 20].

dwatta Appetizer Digestive Hypotensive TonicThe whole plant has a beneficial effect on the digestive system and the blood circulation. It improves the appetite, is digestive, hypotensive and tonic[201]. It has similar properties to garlic (A. sativum), but in a much milder form, and it is rarely used medicinally[238].

nrakta N. America to E. Asia - Siberia, Japan. ksacta Calcareous or basic rock, gravels and shores, Alaska and southwards[43].

propta Seed - sow spring in a cold frame. Germination is usually free and easy, pot up the seedlings as soon as they are large enough to handle easily and plant out in the following spring. Division can be carried out at almost any time of the year but is probably best done in spring. The clumps should be divided at least every 3 or 4 years in order to maintain vigour[200], the divisions can be planted out direct into their permanent positions.

kwatta An easily grown plant[203], it prefers a sunny position in a rich moist but well-drained soil[14, 37]. Succeeds in most soils[1, 37] and in light shade[203]. Grows well in heavy clay soils[203]. Tolerates a pH in the range 5.2 to 8.3. This is a more robust form of *A. schoenoprasum*, the chive. It is often grown in the garden for its edible leaves which are available from late winter to the beginning of the next winter[K]. The bulbs divide rapidly and large clumps are quickly formed. There are some named varieties[183]. Regular cutting of the leaves ensures a continuous supply of young leaves and prevents flowering[33]. Plants can be moved into a frame or other protected environment in the autumn and will then produce leaves throughout the winter[33]. Do not do this every year or it weakens the plants. The bulbs should be planted fairly deeply[1]. A good bee plant[24]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. Helps to reduce the incidence of scab when it is grown under apple trees[201]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233].

5.2.33 *Fragaria x ananassa*

Strawberry

4 tlin 8 cyuc 5 kcaak 3 tcan 0 dwat 0.3 m hkuc
 hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliwis
 hpa7tmwatli fyifxre7t hjonli

drutta *Fragaria x ananassa* is a PERENNIAL growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to July, and the seeds ripen from June to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Leaves Edible Uses: Fruit - raw. Fruits of the best cultivars are sweet and succulent with an exquisite flavour[K]. Strawberries are a very popular fruit and are widely available in the summer. The fruit of some cultivars is up to 3cm in diameter[200]. Young leaves - raw.

tcanta A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

nrakta A hybrid of garden origin, probably *F. virginiana* x *F. chiloensis*. ksacta Not known in the wild.

propta Seed - sow early spring in a greenhouse. The seed can take 4 weeks or more to germinate. The seedlings are very small and slow-growing at first, but then grow rapidly. Prick them out into individual pots when they are large enough to handle and plant them out during the summer. This is a hybrid species and seed will not breed true, though this is the only way to develop new varieties. Division of runners, preferably done in July/August in order to allow the plants to become established for the following years crop[200]. They can also be moved in the following spring if required though should not then be allowed to fruit in their first year. The runners can be planted out direct into their permanent positions.

kwatta Prefers a fertile, well-drained, moisture retentive soil in a sunny position[200]. Tolerates semi-shade though fruit production will be reduced when plants grow in such a position. Strawberries appreciate a mulch of pine or spruce leaves[18]. The strawberry is widely cultivated in temperate areas for its edible fruit, there are many named varieties[183] that can supply fruit from late spring (under cloches) to late autumn. Most strawberry varieties are day-length sensitive and only flower at certain times of the year. However, a number of cultivars have been selected that are not sensitive to day-length and can produce fruit for most of the summer. These cultivars are normally referred to as 'remontants'. The blossom can be damaged by late spring frosts[1]. Oat straw should not be used as a mulch since this can infect the strawberries with stem and bulb eelworm. Strawberry plants are very subject to virus diseases, these are usually spread by an aphid. Plants tend to degenerate after a few years and need to be replaced. Seed is a safe means of propagation though, since this species is of hybrid

origin, the seed will not breed true. Strawberries are a good companion plant, growing well with bush beans, spinach, borage, lettuce and pyrethrum[20]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

5.2.34 *Allium cepa*

Onion, Garden onion

4 tlin 10 cyuc 5 kcaak 3 tcan 3 dwat 0.6 m hkuc
 htut cyutli tcup hwicli hrasjlut hpa7tli flatprikliwisliwis
 hpa7tmwatli xre7t hjonli

drutta *Allium cepa* is an evergreen Bulb growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers moist soil.

pcista There have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of this plant. Dogs seem to be particularly susceptible[76]. Hand eczema may occur with frequent handling. May interfere with drug control of blood sugar [301].

kcakta Edible Parts: Flowers Leaves Root Seed Edible Uses: Bulb - raw or cooked. A very versatile food, the bulb can be 10cm or more in diameter and is widely used in most countries of the world. Eaten raw, it can be sliced up and used in salads, sandwich fillings etc, it can be baked or boiled as a vegetable in its own right and is also commonly used as a flavouring in soups, stews and many other cooked dishes. Some cultivars have been selected for their smaller and often hotter bulbs and these are used for making pickles. Leaves - raw or cooked[2, 37]. There are some cultivars, the spring onions, that have been selected for their leaves and are used in salads whilst still young and actively growing - the bulb is much smaller than in other cultivars and is usually eaten with the leaves. By successional sowing, they can be available at any time of the year. Flowers - raw. Used as a garnish on salads. The flowers are somewhat dry and are less pleasant than many other species[K]. The seeds are sprouted and eaten. They have a delicious onion flavour[K].

tcanta Cosmetic Dye Hair Polish Repellent Rust The juice of the plant is used as a moth repellent and can also be rubbed onto the skin to repel insects[7]. The plant juice can be used as a rust preventative on metals and as a polish for copper and glass[7]. A yellow-brown dye is obtained from the skins of the bulbs[141, 168]. Onion juice rubbed into the skin is said to promote the growth of hair and to be a remedy for baldness[7, 254]. It is also used as a cosmetic to get rid of freckles[7]. The growing plant is said to repel insects and moles[201]. A spray made by pouring enough boiling water to cover 1kg of chopped unpeeled onions is said to increase the resistance of other plants to diseases and parasites[201].

dwatta Anthelmintic Antiinflammatory Antiseptic Antispasmodic Appetizer Carminative Diuretic Expectorant Febrifuge Homeopathy Hypoglycaemic Hypotensive Lithotropic Skin Stings Stomachic Tonic Although rarely used specifically as a medicinal herb, the onion has a wide range of beneficial actions on the body and when eaten (especially raw) on a regular basis will promote the general health of the body. The bulb is anthelmintic, anti-inflammatory, antiseptic, antispasmodic, carminative, diuretic, expectorant, febrifuge, hypoglycaemic, hypotensive, lithotropic, stomachic and tonic[4, 7, 21]. When used regularly in the diet it offsets tendencies towards angina, arteriosclerosis and heart attack[254]. It is also useful in preventing oral infection and tooth decay[254]. Baked onions can be used as a poultice to remove pus from sores[254]. Fresh onion juice is a very useful first aid treatment for bee and wasp stings, bites, grazes or fungal skin complaints[7, 201]. When warmed the juice can be dropped into the ear to treat earache[254]. It also aids the formation of scar tissue on wounds, thus speeding

Use the healing process, and has been used as a cosmetic to remove freckles[7]. Bulbs of red cultivars are harvested when mature in the summer and used to make a homeopathic remedy[232]. This is used particularly in the treatment of people whose symptoms include running eyes and nose[232]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Allium cepa* Onion for appetite loss, arteriosclerosis, dyspeptic complaints, fevers and colds, cough/bronchitis, hypertension, tendency to infection, inflammation of mouth and pharynx, common cold (see [302] for critics of commission E).

nrakta W. Asia - Iran? The original habitat is obscure. ksacta Not known in the wild.

propta Seed. Early sowings can be made in February in a greenhouse to be planted out in late spring. The main sowing is made in March or April in an outdoor seedbed, this bed must be very well prepared. A sowing can also be made in an outdoor seedbed in August of winter hardy varieties (the Japanese onions are very popular for this). These overwinter and provide an early crop of onion bulbs in June of the following year. Onion sets can be planted in March or April. Sets are produced by sowing seed rather thickly in an outdoor seedbed in May or June. The soil should not be too rich and the seedlings will not grow very large in their first year. The plants will produce a small bulb about 1 - 2cm in diameter, this is harvested in late summer, stored in a cool frost-free place over winter and then planted out in April. A proportion of the bulbs will run quickly to seed but most should grow on to produce good sized bulbs.

nwatta Prefers a sunny sheltered position in a rich light well-drained soil[1, 16]. Prefers a pH of at least 6.5[200]. Plants tolerate a pH in the range of 4.5 to 8.3. Onions are best grown in a Mediterranean climate, the hot dry summers ensuring that the bulbs are ripened fully[200]. For best growth, however, cool weather is desirable at the early stages of growth[200]. Plants are frost-tolerant but prolonged temperatures below 10°C cause the bulb to flower[200]. Optimum growth takes place at temperatures between 20 and 25°C[200]. Bulb formation takes place in response to long-day conditions[200]. Plants are perennial but the cultivated forms often die after flowering in their second year though they can perennate by means of off-sets[1]. The onion was one of the first plants to be cultivated for food and medicine[244]. It is very widely cultivated in most parts of the world for its edible bulb and leaves, there are many named varieties capable of supplying bulbs all the year round[200]. This species was derived in cultivation from *A. oschaninii*[203]. Most forms are grown mainly for their edible bulbs but a number of varieties, the spring onions and everlasting onions, have been selected for their edible leaves. There are several sub-species:- *Allium cepa* 'Perutile' is the everlasting onion with a growth habit similar to chives, it is usually evergreen and can supply fresh leaves all winter. *Allium cepa aggregatum* includes the shallot and the potato onion. These are true perennials, the bulb growing at or just below the surface of the ground and increasing by division. Plants can be divided annually when they die down in the summer to provide bulbs for eating and propagation. *Allium cepa proliferum* is the tree onion, it produces bulbils instead of flowers in the inflorescence. These bulbils have a nice strong onion flavour and can be used raw, cooked or pickled. Onions grow well with most plants, especially roses, carrots, beet and chamomile, but they inhibit the growth of legumes[18, 20, 54, 201]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233].

5.2.35 *Allium ursinum*

Wild Garlic

4 tlin 8 cyuc 5 kcak 0 tcan 3 dwat 0.3 m hkuc
pcimhmhtut cyuti tcup hwicli hrasjlut hpa7tli flatprikliw
hpa7tmwatli xre7t hjonli

drutta *Allium ursinum* is a BULB growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from February to June, in flower from May to June, and the seeds ripen from May to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils. Suit-

able pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

pcista There have been cases of poisoning caused by the consumption, in very large quantities and by some mammals, of this species. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Leaves - raw or cooked[2, 5, 9, 12, 24]. Usually available from late January[K]. One report says that they have an overpowering garlic odour that dissipates on cooking[183], though our experience is that they are considerably milder than garlic[K]. The leaves make a very nice addition to salads, and are especially welcome as a vital and fresh green leaf in the middle of winter[K]. Flowers - raw or cooked. These are somewhat stronger than the leaves, in small quantities they make a decorative and very tasty addition to salads[K]. The flowering heads can still be eaten as the seed pods are forming, though the flavour gets even stronger as the seeds ripen[K]. Bulb - raw or cooked[2]. A fairly strong garlic flavour, though it is quite small and fiddly to harvest[K]. The bulbs can be harvested at any time the plant is dormant from early summer to early winter. Harvested in early summer, they will store for at least 6 months[K]. The bulbs can be up to 4cm long and 1cm in diameter[00]. The small green bulbils are used as a caper substitute[183].

tcanta Companion Disinfectant Repellent The juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20]. The juice of the plant has been used as a general household disinfectant[7].

dwatta Anthelmintic Antiasthmatic Anticholesterolemic Antiseptic Antispasmodic Astringent Cholagogue Depurative Diaphoretic Disinfectant Diuretic Expectorant Febrifuge Hypotensive Rubefacient Stimulant Stomachic Tonic Vasodilator Ramsons has most of the health benefits of the cultivated garlic, *A. sativum*[7, 238], though it is weaker in action[254]. It is therefore a very beneficial addition to the diet, promoting the general health of the body when used regularly. It is particularly effective in reducing high blood pressure and blood cholesterol levels[9]. It is recognised as having a good effect on fermentative dyspepsia[244]. All parts of the plant can be used, but the bulb is most active. The plant is anthelmintic, antiasthmatic, anticholesterolemic, antiseptic, antispasmodic, astringent, cholagogue, depurative, diaphoretic, diuretic, expectorant, febrifuge, hypotensive, rubefacient, stimulant, stomachic, tonic and vasodilator[7, 21]. Ramsons ease stomach pain and are tonic to the digestion, so they can be used in the treatment of diarrhoea, colic, wind, indigestion and loss of appetite[254]. The whole herb can be used in an infusion against threadworms, either ingested or given as an enema[254]. The herb is also beneficial in the treatment of asthma, bronchitis and emphysema[254]. The juice is used as an aid to weight loss and can also be applied externally to rheumatic and arthritic joints where its mild irritant action and stimulation to the local circulation can be of benefit[254].

nrakta Much of Europe, including Britain, east to the Caucasus and W. Asia. ksacta Damp soils in woods, copses, valleys and similar moist shady localities[9].

propta Seed - best sown as soon as it is ripe either in situ or in a cold frame. It germinates quickly and can be grown on in the greenhouse for the first year, planting out the dormant bulbs in the late summer of the following year. Stored seed can be sown in spring in a greenhouse. Division in summer after the plants have died down. Very easy, the divisions can be planted out straight into their permanent positions.

nwatta Prefers woodland conditions in a moist well-drained soil[203]. Plants are often found in the wild growing in quite wet situations[K]. When growing in suitable conditions, wild garlic forms a dense carpet of growth in the spring and can be a very invasive plant[24, 203, K]. It dies down in early summer, however, allowing other plants to grow in the same space[K]. The bulbs should be planted fairly deeply[1]. The seeds are dispersed by ants[244]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233].

5.2.36 Fragaria vesca 'Semperflorens'

Alpine Strawberry

4 tlin 8 cyuc 5 kcak 0 tcan 3 dwat 0.3 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikliw
wisslip hpa7tmwatli xre7t hjonli

drutta Fragaria vesca 'Semperflorens' is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to November, and the seeds ripen from June to November. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Leaves Edible Uses: Coffee Tea Fruit - raw, cooked or made into preserves[183]. Sweet and succulent with an exquisite taste, they are far superior to the cultivated strawberry[K]. The fruit is fairly small, up to 15mm in diameter, but it is produced abundantly from early summer until the frosts of autumn[K]. Young leaves - raw or cooked[52, 105]. Added to salads or used as a potherb[183]. The fresh or dried leaves are used as a tea substitute[7, 177, 183]. The root has been used as a coffee substitute in India[240].

tcanta Compost Teeth The flowers are an alternative ingredient of 'Quick Return' herbal compost activator[32]. This is a dried and powdered mixture of several herbs that can be added to a compost heap in order to speed up bacterial activity and thus shorten the time needed to make the compost[K]. The fruit is used as a tooth cleaner[4]. The fresh fruit removes stains from teeth if it is allowed to remain for about 5 minutes[4]. The fruit is also used cosmetically in skin-care creams[7]. It tones and whitens the skin, combats wrinkles, lightens freckles, soothes sunburn and whitens the teeth[244].

dwatta Astringent Diuretic Laxative Tonic The leaves and the fruit are astringent, diuretic, laxative and tonic[4, 9, 222]. The leaves are mainly used, though the fruits are an excellent food to take when feverish and are also effective in treating rheumatic gout[4]. A slice of strawberry is also excellent when applied externally to sunburnt skin[4]. A tea made from the leaves is a blood tonic[222]. It is used in the treatment of chilblains[53] and also as an external wash on sunburn[222]. The leaves are harvested in the summer and dried for later use[238]. The fruits contain salicylic acid and are beneficial in the treatment of liver and kidney complaints, as well as in the treatment of rheumatism and gout[244]. The roots are astringent and diuretic[4, 222]. A decoction is used internally in the treatment of diarrhoea and chronic dysentery[4, 244]. Externally it is used to treat chilblains and as a throat gargle[244]. The roots are harvested in the autumn and dried for later use[238].

nrakta Most of Europe, including Britain, to temperate Asia. ksacta Woodland and damp undergrowth[7].

propta Seed - sow early spring in a greenhouse. The seed can take 4 weeks or more to germinate. The seedlings are very small and slow-growing at first, but then grow rapidly. Prick them out into individual pots when they are large enough to handle and plant them out during the summer.

nwatta Prefers a fertile, well-drained, moisture retentive soil in a sunny position[27, 200]. Tolerates semi-shade though fruit production will be reduced when plants are growing in such a position. Prefers some shade according to some reports[3, 31]. Plants are often found on clay soils[31] and on soils overlying chalk[13]. Alpine strawberries appreciate a mulch of pine or spruce leaves[18]. The alpine strawberry is often cultivated in the garden for its edible fruit. This fruit is fairly small but exquisitely flavoured and is freely produced from June to November. There are some named varieties[183]. It is not very feasible to grow this plant on a commercial scale because it is very labour intensive to pick and it is also hard to get the fruit to market in good quality. However, it is sometimes grown by specialised growers for the luxury market. The main drawback of growing this plant is that it tends to lose vigour after about 2 - 3 years, partly

due to virus diseases and partly because the plant flowers and fruits so freely that it exhausts itself.

5.2.37 Agastache foeniculum

Anise Hyssop, Blue giant hyssop

4 tlin 9 cyuc 5 kcak 3 tcan 1 dwat 0.9 m hkuc
htut cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikliw
hpa7tmwatli fyifxre7t hjonli

drutta Agastache foeniculum is a PERENNIAL growing to 0.9 m (3ft) by 0.4 m (1ft 4in). See above for USDA hardiness. It is hardy to UK zone 8 and is not frost tender. It is in flower in July, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Flowers Leaves Edible Uses: Drink Tea Leaves and flowers - raw or cooked. They are used as a flavouring in raw or cooked dishes[108, 177, 257]. Excellent raw, they have a sweet aniseed flavour and are one of our favourite flavourings in salads[K]. They make a delicious addition to the salad bowl[183] and can also be used to flavour cooked foods, especially acid fruits[K]. The only drawback to the leaves is that they tend to have a drying effect in the mouth and so cannot be eaten in quantity[K]. A pleasant tasting tea is made from the leaves[46, 61, 161, 183].

tcanta Attracts wildlife. Invertebrate Shelter, nectary. Aromatic.

dwatta Cardiac Diaphoretic Pectoral Poultice The leaves are cardiac and diaphoretic[222, 238, 257]. An infusion of the leaves is used in the treatment of colds, fevers, weak heart etc[222]. When left to go cold, the infusion is used to treat pains in the chest (such as when the lungs are sore from too much coughing)[207]. A poultice of leaves and stems can be used to treat burns[257].

nrakta Western N. America - Ontario to Washington, south to Colorado. ksacta Dry thickets, fields and waste ground[43] on prairies and plains[235].

propta Seed - sow spring in a greenhouse and only just cover the seed. The seed usually germinates in 1 - 3 months at 13°C[133]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the greenhouse for their first year. Plant out in late spring or early summer[K]. Division in spring. Fairly simple, if large divisions are used it is possible to plant them straight out into their permanent positions. Basal cuttings of young shoots in spring[111]. Harvest the young shoots when they are about 10 - 15cm tall and pot them up in a lightly shaded position in a greenhouse. They should root within 3 weeks and can be planted out in the summer or following spring.

nwatta Prefers a sunny position and a dry well-drained soil[187, 200]. This species is not hardy in the colder areas of the country, it tolerates temperatures down to between -5 and -10°C[200]. The young growth in spring is very susceptible to slug damage[K]. The flowering plants are very attractive to bees and butterflies[K]. There is at least one named variety. 'Texas American' has an anise-pennyroyal fragrance and is used in a similar way to the species[183]. The plant is heat tolerant in zones 12 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2].

5.2.38 Allium cepa ascalonicum

Shallot

4 tlin 8 cyuc 5 kcaak 0 tcan 3 dwat 0.3 m hkuc
htut cyutli tcup hwicli hrasljut hpa7tli flatprikliwslip
hpa7tmwatli xre7t hjonli

drutta Allium cepa ascalonicum is a BULB growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers moist soil.

pcista There have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of this plant. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Bulb - raw or cooked. A mild onion flavour, the bulbs can be up to 6cm in diameter. They can be added to salads etc, cooked as a vegetable or used as a flavouring in soups etc[1, 2, 16, 37]. Leaves - raw or cooked. A pleasant onion flavour, though they should not be harvested in quantity since this would reduce production of the bulbs[K]. Flowers - raw. Used as a garnish on salads. The flowers are somewhat dry and are less pleasant than many other species[K].

tcanta Cosmetic Dye Hair Polish Repellent Rust The juice of the plant is used as a moth repellent and can also be rubbed onto the skin to repel insects[7]. The plant juice can be used as a rust preventative on metals and as a polish for copper and glass[7]. A yellow-brown dye is obtained from the skins of the bulbs[141, 168]. Onion juice rubbed into the skin is said to promote the growth of hair and to be a remedy for baldness[7]. It is also used as a cosmetic to get rid of freckles[7]. The growing plant is said to repel insects and moles[201]. A spray made by pouring enough boiling water to cover 1kg of chopped unpeeled onions is said to increase the resistance of other plants to diseases and parasites[201].

dwatta Alterative Anthelmintic Antiinflammatory Antiseptic Antispasmodic Astringent Carminative Diuretic Expectorant Febrifuge Hypoglycaemic Hypotensive Lithontripic Nutritive Skin Stings Stomachic Tonic Vulnerary Although rarely used specifically as a medicinal herb, the onion has a wide range of beneficial actions on the body and when eaten (especially raw) on a regular basis will promote the general health of the body. The bulb is anthelmintic, anti-inflammatory, antiseptic, antispasmodic, carminative, diuretic, expectorant, febrifuge, hypoglycaemic, hypotensive, lithontripic, stomachic and tonic[4, 7, 21]. When used regularly in the diet it offsets tendencies towards angina, arteriosclerosis and heart attack[254]. It is also useful in preventing oral infection and tooth decay[254]. Baked onions can be used as a poultice to remove pus from sores[254]. Fresh onion juice is a very useful first aid treatment for bee and wasp stings, bites, grazes or fungal skin complaints[7, 201]. When warmed the juice can be dropped into the ear to treat earache[254]. It also aids the formation of scar tissue on wounds, thus speeding up the healing process, and has been used as a cosmetic to remove freckles[7].

nrakta Original habitat is obscure. ksacta Not known in the wild.

propta Plant out bulbs in late winter or very early spring. Plant firmly to half the bulbs depth and protect from birds until the bulbs have rooted[200]. (Birds seem to have a fascination for pulling the bulbs out of the ground and then leaving them lying on the surface[K].) Traditionally, bulbs were planted on the shortest day and harvested on the longest. Smaller bulbs are less likely to bolt as a result of exposure to cold conditions[200].

nwatta Prefers a sunny position in a light well-drained soil but tolerates most soils.[1, 200]. Does not grow well on heavy clays[200]. Prefers a pH in the range 6 to 7[200]. Tolerates a pH in the range 4.5 to 8.3. We are using the name A. cepa ascalonicum for this plant in order to differentiate it from the potato onion, A. cepa aggregatum, though it should really be included in A. cepa aggregatum[K]. This is a genuinely perennial form of A. cepa that is widely grown in temperate and tropical areas for its edible bulbs[200]. These are milder but smaller than the onion. There are several named forms[200]. The plant is easier to grow than onions, matures faster and keeps better[200], though yields are lower. Plants

are very tolerant of high temperatures up to 30°C and bulb only occurs at temperatures above 20°C[200]. Plants rarely produce viable seed in temperate areas, they are usually propagated by means of their bulbs, each one dividing up in the growing season to produce from 2 to more than 12 new bulbs[200]. Bulbs can become infected with virus, it is important to only plant clean stock[200]. Closely related to A. oschanini. O.Fedsch., a wild species found in C. Asia. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233].

5.2.39 Viola odorata

Sweet Violet, English Violet, Garden Violet, Sweet Violet, Florist's Violet

4 tlin 8 cyuc 5 kcaak 3 tcan 3 dwat 0.1 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikliwslip
hpa7tmwatli fyifxre7t hjonli

drutta Viola odorata is an evergreen Perennial growing to 0.1 m (0ft 4in) by 0.5 m (1ft 8in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf all year, in flower from February to April, and the seeds ripen from April to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, Cleistogomy (self-pollinating without flowers ever opening). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista May cause vomiting. Possible additive effect with laxatives [301].

kcakta Edible Parts: Flowers Leaves Edible Uses: Condiment Tea Young leaves and flower buds - raw or cooked[21, 85, 183]. Usually available all through the winter[K]. The leaves have a very mild flavour, though they soon become quite tough as they grow older. They make a very good salad, their mild flavour enabling them to be used in bulk whilst other stronger-tasting leaves can then be added to give more flavour[K]. When added to soup they thicken it in much the same way as okra[62, 85, 159]. Also used as a flavouring in puddings etc. A tea can be made from the leaves[85]. Flowers - raw. Used to decorate salads and desserts[5, 9, 85]. A sweet mild flavour with a delicate perfume, the flowers are an especially welcome decoration for the salad bowl since they are available in late winter[K]. The flowers are also used fresh to flavour and colour confectionery[238]. A soothing tea can be made from the leaves and flowers[85, 183]. A leaf extract is used to flavour sweets, baked goods and ice cream[183].

tcanta Essential Litmus An essential oil from the flowers and leaves is used in perfumery[57, 100]. 1000kg of leaves produces about 300 - 400g absolute[46]. The flowers are used to flavour breath fresheners[238]. A pigment extracted from the flowers is used as a litmus to test for acids and alkalines[4, 13, 100, 115]. Plants can be grown as a ground cover when spaced about 30cm apart each way[208]. They make an effective weed-excluding cover[K], ornamental. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Antiinflammatory Antirheumatic Cancer Demulcent Diaphoretic Diuretic Emetic Emollient Expectorant Homeopathy Laxative Purgative Urinary Sweet Violet has a long and proven history of folk use, especially in the treatment of cancer and whooping cough[4, 165, 218]. It also contains salicylic acid, which is used to make aspirin[244]. It is therefore effective in the treatment of headaches, migraine and insomnia[244]. The whole plant is anti-inflammatory, diaphoretic, diuretic, emollient, expectorant, and laxative[4, 7, 21, 46, 165]. It is taken internally in the treatment of bronchitis, respiratory catarrh, coughs, asthma, and cancer of the breast, lungs or digestive tract[238]. Externally, it is used to treat mouth and throat infections[238]. The plant can either be used fresh, or harvested when it comes into flower and then be dried for later use[4]. The flowers are demulcent and emollient[240]. They are used in the treatment of biliousness and lung troubles[240]. The petals are made into a syrup and

in the treatment of infantile disorders[240]. The roots are a much stronger expectorant than other parts of the plant but they also contain the alkaloid violine which at higher doses is strongly emetic and purgative[4, 244, 254]. They are gathered in the autumn and dried for later use[7]. The seeds are diuretic and purgative. They have been used in the treatment of urinary complaints are considered to be a good remedy for gravel[4]. A homeopathic remedy is made from the whole fresh plant[4]. It is considered useful in the treatment of spasmodic coughs and rheumatism of the wrist[4]. An essential oil from the flowers is used in aromatherapy in the treatment of bronchial complaints, exhaustion and skin complaints[238].

nrakta Europe, including Britain, from Norway south and east to N. Africa, W. Asia and Syria. ksacta Fields, hedgerows and woodlands, especially on calcareous soils[7, 17, 31].

propta Seed - best sown in the autumn in a cold frame. The seed requires a period of cold stratification and the germination of stored seed can be erratic. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. Division in the autumn or just after flowering. Larger divisions can be planted out direct into their permanent positions, though we have found that it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame until they are growing away well. Plant them out in the summer or the following spring.

nwatta Landscape Uses:Alpine garden, Border, Container, Ground cover, Massing, Rock garden, Woodland garden. Succeeds in most soils but prefers a cool moist well-drained humus-rich soil in partial or dappled shade and protection from scorching winds[1, 14, 31, 200]. When grown in the open it prefers a moderately heavy rich soil[1]. Plants have done very well in a hot dry sunny position on our Cornish trial grounds[K]. Tolerates sandstone and limestone soils. Plants are hardy to about -20°C[187]. Sweet violets are very ornamental plants, there are many named varieties[187]. They produce their delicately scented flowers in late winter and early spring - these are designed for fertilisation by bees and since there are few bees around at this time of year these flowers seldom set seed[4]. However, the plants also produce a second type of flower later in the year. These never open, but seed is produced within them by self-fertilisation[4]. The plants will often self-sow freely when well-sited[188]. They can also spread fairly rapidly at the roots when they are growing well[K]. Responds well to an annual replanting in rich loose leafy soils[187]. All members of this genus have more or less edible leaves and flower buds, though those species with yellow flowers can cause diarrhoea if eaten in large quantities[62, 85, 159]. Special Features: Edible, Not North American native, Invasive, Naturalizing, Suitable for cut flowers, Extended bloom season in Zones 9A and above, Fragrant flowers. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

5.2.40 Carya hybrids

Hybrid and neohybrid hickories

4 tlin 11 cyuc 4 kcak 3 tcan 3 dwat 40 m hkuc
htut cyutli kyuctcup hwicli hrasjltutnyik hpa7tli flatprikhwis hpa7tmwatli hjonli

drutta Carya hybrids is a deciduous Tree growing to 40 m (131ft) by 35 m (114ft) at a medium rate. See above for USDA hardness. It is hardy to UK zone 4. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Leaves Oil SeedEdible Uses: Oil-Carbon Farming Solutions - Staple Crop: oil (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1].

tcanta OilSee individual plant entries. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta See individual species.

nrakta Hybrid origin. ksacta Not native

propta Seed - requires a period of cold stratification. It is best sown in a cold frame as soon as it is ripe[78]. Stored seed should be kept moist (but not wet) prior to sowing and should be sown in a cold frame as soon as possible[78]. Where possible, sow 1 or 2 seeds only in each deep pot and thin to the best seedling. If you need to transplant the seedlings, then do this as soon as they are large enough to handle, once more using deep pots to accommodate the tap root. Put the plants into their permanent positions as soon as possible, preferably in their first summer, and give them some protection from the cold for at least the first winter[78, K]. Seed can also be sown in situ so long as protection is given from mice etc and the seed is given some protection from cold[200] (a plastic bottle with the top and bottom removed and a wire mesh top fitted to keep the mice out is ideal)

nwatta Management: Standard Minor Global Crop Staple Crop: OilClimate: cold temperate to subtropical, tropical highlands. Humidity: humid. Carbon Farming Solutions - Cultivation: minor global crops. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.2.41 Castanea species

Chestnut Hybrids

4 tlin 9 cyuc 4 kcak 4 tcan 2 dwat 30 m hkuc
hmimhtut cyutli hgatkyuctcup hwicli hyishrasjltutnyik hpa7tli flatprik hpa7tmwatli hjonli

drutta Castanea species is a deciduous Tree growing to 30 m (98ft) by 25 m (82ft) at a fast rate. See above for USDA hardness. It is hardy to UK zone 4. It is in flower in July, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought.

kcakta Edible Parts: SeedEdible Uses: Seed - raw or cooked[183]. Eaten raw, there is a distinct astringency, especially if the fleshy inner skin beneath the outer shell of the seed is not removed[K]. When cooked, however, and especially when baked, the seed becomes much sweeter and has a floury texture[K]. It then makes an excellent food and can be used as a staple food in much the same way as potatoes or cereals[K]. The seed is low in fats and oils but high in carbohydrates[183]. Carbon Farming Solutions - Staple Crop: balanced carb (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1].

tcanta The bark, leaves, wood and seed husks all contain tannin. Wood - hard, strong, light. Carbon Farming Solutions - Industrial Crop: biomass, tannin (Crops grown for non-food uses. Industrial crops provide resources in three main categories: materials, chemicals, and energy. Traditional materials include lumber and thatch, paper and cardboard, and textiles) [1-1]. Other Systems: woody agriculture.

dwatta Some see for example the individual entries for Castanea dentata, Castanea mollissima, Castanea pumila

nrakta Hybrid origin ksacta Not known in a wild situation.

propta Seed - where possible sow the seed as soon as it is ripe in a cold frame or in a seed bed outdoors[78]. The seed must be protected from mice and squirrels. The seed has a short viability and must not be allowed to become dry. It can be stored in a cool place, such as the salad compartment of

for a few months if it is kept moist, but check regularly for signs of germination. The seed should germinate in late winter or early spring. If sown in an outdoor seedbed, the plants can be left in situ for 1 - 2 years before planting them out in their permanent positions. If grown in pots, the plants can be put out into their permanent positions in the summer or autumn, making sure to give them some protection from the cold in their first winter[K]. These plants are of hybrid origin, so seed is unlikely to breed true[K].

nwatta Industrial Crop: Biomass Industrial Crop: Tannin Management: Coppice Management: Standard New Crop Other Systems: Woody agriculture Staple Crop: Balanced carbClimate: cold to warm temperate. Humidity: humid. This record includes a number of garden hybrids involving various species - the origin of each hybrid will be mentioned in the individual cultivar notes. To date, these different hybrids have not been assigned their own specific name. The following notes are based on the general needs of the genus. Prefers a good well-drained slightly acid loam but succeeds in dry soils[1, 11, 200]. Once established, it is very drought tolerant[1, 11, 200]. Very tolerant of highly acid, infertile dry sands[200]. Averse to calcareous soils but succeeds on harder limestones[11, 200]. An excellent soil-enriching understorey in pine forests[200]. Flowers are produced on wood of the current year's growth[229]. Plants are fairly self-sterile[200]. They hybridize freely with other members of this genus[200]. Plants in this genus are notably resistant to honey fungus[200]. Carbon Farming Solutions - Cultivation: new crop. Management: standard, coppice (Describes the non-destructive management systems that are used in cultivation) [1-1].

5.2.42 *Aesculus* spp

Horse chestnut

4 tlin 9 cyuc 4 kcak 4 tcan 4 dwat 30 m hkc
hmimhtut cyutli kyuctcup hwicli hyhshrasjlutnyikfrip hpa7tli
flatprlikwis hpa7tmwatli hjonli

drutta *Aesculus* spp is a deciduous Tree growing to 30 m (98ft) by 25 m (82ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

pcista The seed is rich in saponins[10, 21, 65]. Although poisonous, saponins are poorly absorbed by the human body and so most pass through without harm. Saponins are quite bitter and can be found in many common foods such as some beans. They can be removed by carefully leaching the seed or flour in running water. Thorough cooking, and perhaps changing the cooking water once, will also normally remove most of them. However, it is not advisable to eat large quantities of food that contain saponins. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K]. Avoid in patients with kidney or liver disease. Avoid if taking warfarin as can interfere with anticoagulant therapy [301].

kcakta Edible Parts: SeedEdible Uses: The roasted seed is used as a coffee substitute[2, 7]. Seed - cooked. It can be dried, ground into a powder and used as a gruel[7, 46, 55, 61]. The seed is quite large, about 3cm in diameter, and is easily harvested. It is usually produced in abundance in Britain. Unfortunately the seed is also rich in saponins, these must be removed before it can be used as a food and this process also removes many of the minerals and vitamins, leaving behind mainly starch. See also the notes above on toxicity. The seed contains up to 40% water, 8 - 11% protein and 8 - 26% toxic saponins[218]. The following notes apply to *A. californica*, but are probably also relevant here:- The seed needs to be leached of toxins before it becomes safe to eat - the Indians would do this by slow-roasting the nuts (which would have rendered the saponins harmless) and then cutting them into thin slices, putting them into a cloth bag and rinsing them in a stream for 2 - 5 days[213].

tcanta Saponins in the seed are used as a soap substitute[169]. The saponins can be easily obtained by chopping

the seed into small pieces and infusing them in hot water. This water can then be used for washing the body, clothes etc. Its main drawback is a lingering odour of horse chestnuts[K]. The seed contains variable amounts of saponins, up to a maximum of 10%[240]. A starch obtained from the seed is used in laundering[100]. The bark and other parts of the plant contain tannin, but the quantities are not given[223]. A yellow dye is obtained from the bark[4]. The flowers contain the dyestuff quercetin[223]. Wood - soft, light, not durable. Of little commercial value, it is used for furniture, boxes, charcoal[2, 11, 46, 61]. Carbon Farming Solutions - Industrial Crop: starch, medicinal (Crops grown for non-food uses). Industrial crops provide resources in three main categories: materials, chemicals, and energy. Traditional materials include lumber and thatch, paper and cardboard, and textiles) [1-1].

dwatta Various medicinal qualities depending on the species. They include: Alterative; Analgesic; Antiinflammatory; Antirheumatic; Astringent; Bach; Diuretic; Expecto- rant; Febrifuge; Haemostatic; Narcotic; Tonic; Vasoconstrictor; Vnukary.

nrakta N. Temperate. ksacta Trees and shrubs native to the temperate Northern Hemisphere, with six species native to North America and seven to 13 species native to Eurasia.

propta Seed - best sown outdoors or in a cold frame as soon as it is ripe[11, 80]. The seed germinates almost immediately and must be given protection from severe weather[130]. The seed has a very limited viability and must not be allowed to dry out. Stored seed should be soaked for 24 hours prior to sowing and even after this may still not be viable[80, 113]. It is best to sow the seed with its 'scar' downwards[130]. If sowing the seed in a cold frame, pot up the seedlings in early spring and plant them out into their permanent positions in the summer.

nwatta Hypothetical Crop Industrial Crop: Medicinal Industrial Crop: Starch Management: StandardClimate: cold to warm temperate, Mediterranean.Humidity: semi-arid to humid. Landscape Uses: Firewood, Pollard, Specimen, Street tree. Prefers a deep loamy well-drained soil but is not too fussy tolerating poorer drier soils[11, 200]. Tolerates exposed positions and atmospheric pollution[200]. A very ornamental and fast-growing tree[1, 4], it succeeds in most areas of Britain but grows best in eastern and south-eastern England[200]. Trees are very hardy when dormant, but the young growth in spring can be damaged by late frosts. The flowers have a delicate honey-like perfume[245]. Trees are tolerant of drastic cutting back and can be severely lopped[200]. They are prone to suddenly losing old heavy branches[98]. The tree comes into bearing within 20 years from seed[98]. Most members of this genus transplant easily, even when fairly large[11]. Special Features: Attractive foliage, Not North American native, Naturalizing, Blooms are very showy. Carbon Farming Solutions - Cultivation: hypothetical. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

5.2.43 *Fagus sylvatica*

Beech, European beech, Common Beech

4 tlin 7 cyuc 4 kcak 4 tcan 2 dwat 30 m hkc
pcimhmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli
frusflatprlikwisslip hpa7tmwatli hjonli

drutta *Fagus sylvatica* is a deciduous Tree growing to 30 m (98ft) by 15 m (49ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to May, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid and very alkaline soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

pcista Large quantities of the seed may be toxic[65, 76].

kcakta Edible Parts: Leaves Oil SeedEdible Uses: Coffee OilYoung leaves - raw[183]. A very nice mild flavour, they go

in a mixed salad. However, the leaves quickly become tough so only the youngest should be used[2, 5, 12, K]. New growth is usually produced for 2 periods of 3 weeks each year, one in spring and one in mid-summer. Seed - raw or cooked[2, 5, 7, 63, 183]. A pleasant sweet flavour, though rather small and fiddly[K]. The seed can also be dried and ground into a powder and then used with cereal flours when making bread, cakes etc[12]. The seed is rich in oil. The seed should not be eaten in large quantities because it contains a deleterious principle[65, 238]. The seed contains 17 - 20% of an edible semi-drying oil[4, 7, 8, 57]. This stores well without going rancid and is said to be equal in delicacy to olive oil[183]. It is used as a dressing for salads and also for cooking[238]. The seed residue is poisonous[9, 57]. The roasted seed is used as a coffee substitute[2, 63].

tcanta Charcoal Fuel Hedge Hedge Oil Stuffing Teeth WoodA semi-drying oil is obtained from the seed, it is used as a fuel for lighting, as a lubricant, for polishing wood etc[12, 13, 46, 57, 63]. The seed residue is poisonous[9, 57]. The leaf buds harvested in the winter and dried on the twigs are used as toothpicks[66]. The leaves are gathered in autumn and used as a stuffing material for mattresses etc[115]. Wood - hard, heavy, strong, very durable[13, 46]. It is not suitable for outdoor use[1] and is often attacked by a small beetle[4]. It has a wide range of applications, including furniture, flooring, turnery etc[100]. It makes a very good fuel[6, 66], burning with a lot of heat[4], and yields a charcoal known as 'Carbo Ligni Pulveratus'[46]. The wood has often been used as a source of creosote, tar, methyl alcohol, acetic acid[123]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwata Antacid Antipyretic Antiseptic Antitussive Bach Expectorant Odontalgic SkinThe bark is antacid, antipyretic, antiseptic, antitussive, expectorant, odontalgic[7, 9]. A tar (or creosote), obtained by dry distillation of the branches, is stimulating and antiseptic[4]. It is used internally as a stimulating expectorant and externally as an application to various skin diseases[4, 238]. The pure creosote has been used to give relief from toothache, but it should not be used without expert guidance[7]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Intolerance', 'Criticism' and 'Passing judgements'[209].

nrakta Europe, including Britain, from Norway south and east to Spain, Greece, W. Russia and the Crimea. ksacta Grows in woodlands where it is often the dominant species, especially on chalky and soft limestone soils, though sometimes also on well-drained loams and sands[13, 17].

propta Seed - the seed has a short viability and is best sown as soon as it is ripe in the autumn in a cold frame. Protect the seed from mice. Germination takes place in the spring. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. The seedlings are slow growing for the first few years and are very susceptible to damage by late frosts. The seed can also be sown in an outdoor seedbed in the autumn[186]. The seedlings can be left in the open ground for three years before transplanting, but do best if put into their final positions as soon as possible and given some protection from spring frosts.

nwatta Landscape Uses:Firewood, Pest tolerant, Hedge, Aggressive surface roots possible, Screen, Specimen. Thrives on a light or medium soil, doing well on chalk, but ill-adapted for a heavy wet soil[1, 11]. Prefers a calcareous soil but succeeds in acid soils though it does not make such a fine tree in such a situation[186]. Succeeds in almost any soil and any pH, it is also very tolerant of a wide range of climatic conditions so long as there is sufficient rainfall[200].

Established trees are drought tolerant[186]. Very wind tolerant but dislikes salt[200]. Trees are shallow rooted and this might make them less wind resistant[186]. Trees have two growth periods a year, each of about 3 weeks in duration. The first is in spring around the end of April, the second is in summer, around the end of July. Trees are often slow growing and also can be very slow to establish after transplanting. However, in good conditions they are capable of growing up to a metre in a year. Young trees are very shade tolerant, but are subject to frost damage to their flowers and young leaves and so are best grown in a woodland position which will protect them[200]. An important food plant for

many caterpillars, it has 64 species of associated insects[29]. Trees have a heavy canopy and cast a dense shade, very few other species can grow in a dense beech wood and on suitable soils it becomes the dominant species[186]. Very intolerant of coppicing, trees producing none or only very weak growth afterwards and this is soon smothered by other plants[186]. Plants are very tolerant of light pruning however and if this is carried out in late summer the plants will retain their dead leaves over winter[29]. There are many named forms selected for their ornamental value. Those forms with purple leaves prefer a position in full sun whilst forms with yellow leaves prefer some shade[188]. This species is notably resistant to honey fungus[200]. Special Features: Not North American native, All or parts of this plant are poisonous, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 9 through 4. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

5.2.44 Acer saccharum

Sugar Maple, Florida Maple, Hard Maple, Rock Maple 4 tlin 8 cyuc 4 kcak 4 tcan 2 dwat 30 m hkuc hmimhtut cyutli tcup hwicli hrasjltutnykfrrip hpa7tli frusflat-prikliwis hpa7tmwawli xre7t hjonli

drutta Acer saccharum is a deciduous Tree growing to 30 m (98ft) by 12 m (39ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to May, and the seeds ripen from October to December. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It can tolerate atmospheric pollution.

kcakta Edible Parts: Inner bark Leaves Sap SeedEdible Uses: SweetenerThe sap contains quite a large proportion of sugar. This can be used as a refreshing drink, or be concentrated into a syrup by boiling off the water[1, 2, 11, 34, 57]. The syrup is used as a sweetener on many foods. The sap can be harvested in late winter or early spring[[142], the flow is best on a warm sunny day after a frost[213]. Trees on southern slopes in sandy soils give the best yields. It is best to make a hole about 7cm deep and about 1.3 metres above the ground[171]. Yields of 40 - 100 litres per tree can be obtained[142]. The best sap production comes from cold-winter areas with continental climates. The sap contains 2 - 6% sugar, thus about 32 litres are required to make a litre of maple syrup[229]. Self-sown seedlings, gathered in early spring, are eaten fresh or dried for later use[213]. Seeds - cooked. The wings are removed and the seeds boiled then eaten hot[62, 105, 159, 213]. The seed is about 6mm long and is produced in small clusters[82]. Inner bark - cooked. It is dried, ground into a powder and then used as a thickening in soups etc or mixed with cereals when making bread[105, 161]. The related Oregon Maple (*Acer macrophyllum*) has yellow flower clusters, sweet with nectar, eaten raw[183].

No information was found for this species.

tcanta Companion Fodder Fuel Potash Preservative WoodThe leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. Wood - close grained, tough, hard, heavy, strong, not very durable, it takes a high polish, remains smooth under abrasion and has a high shock-resistance[46, 61, 82, 171, 227]. It holds nails well, is fair in gluing, dries easily and shrinks moderately[227]. The wood weighs 43lb per cubic foot[235]. Considered by many to be

the most valuable hardwood tree in N. America, the sugar maple is used for a wide range of applications including furniture, flooring, turnery, musical instruments and ship building[46, 61, 82, 171, 227]. Accidental forms with the grain curled and contorted, known as curly maple and bird's eye maple, are common and are highly prized in cabinet making[82]. The wood is also a very good fuel, giving off a lot of heat and forming very hot embers[82, 226]. The ashes of the wood are rich in alkali and yield large quantities of potash[82]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Blood tonic Diuretic Expectorant Hepatic OphthalmicA tea made from the inner bark is a blood tonic, diuretic and expectorant[222]. It has been used in the treatment of coughs, diarrhoea etc[222]. A compound infusion of the bark has been used as drops in treating blindness[257]. The sap has been used for treating sore eyes[257]. The inner bark has been used as an expectorant and cough remedy[257]. Maple syrup is used in cough syrups and is also said to be a liver tonic and kidney cleanser[222].

nrakta Eastern N. America - Newfoundland to Georgia, west to Texas and Minnesota. ksacta Found in a variety of soil types, doing best in deep rich well-drained soils from sea level to 1600 metres[229]. Rich usually hilly woods[43].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. A lot of the seed is non-viable, it is best to cut a few open to see if there is an embryo[113]. An average of 95% germination can be achieved from viable seed[98]. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate, sometimes taking two years[125]. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter.

nwatta Agroforestry Services: Crop shade Fodder: Bank Management: Standard Regional Crop Staple Crop: SugarLandscape Uses:Firewood, Screen, Specimen, Street tree, Woodland garden. Of easy cultivation, it prefers a good moist well-drained soil but succeeds on most soils[11, 98], though it is more likely to become chlorotic as a result of iron deficiency on alkaline soils. Grows well in heavy clay soils. Trees need full light and a lot of space[98]. This species is one of the most shade tolerant of the N. American maples[226]. It tolerates atmospheric pollution[200] and so is often used as a street tree, though it can suffer from soil compaction and the use of salt on the roads in frosty weather. Tolerates a pH in the range 4.5 to 7.3. Hardy to about -45°C when fully dormant[160]. A fast-growing tree for its first 40 years in the wild[229], this species is not a great success in Britain[1], though it does better than once thought[11]. It grows well in Cornwall[59]. In cultivation it has proved to be slow growing when young[11]. Trees can live for 250 years in the wild[229]. A very ornamental tree[1] but a bad companion plant, inhibiting the growth of nearby plants[18, 20]. This species is commercially exploited in America for its sap[1, 11]. Along with its sub-species it is the major source of maple syrup[11]. There are some named varieties[183]. The sap can be tapped within 10 - 15 years from seed but it does not flow so well in areas with mild winters[160]. Special Features:Attracts birds, North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no

heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2].

5.2.45 Acer saccharum nigrum

Black Maple

4 tin 6 cyuc 4 kcaac 2 tcanc 1 dwat 25 m hku
hmimhtut cyutli tcup hwicli hrasjlutnykfrp hpa7tli flatprik-
wis hpa7tmwatli hjonli

drutta Acer saccharum nigrum is a deciduous Tree growing to 25 m (82ft 0in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in April, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Inner bark Sap SeedEdible Uses: SweetenerThe sap contains reasonable quantities of sugar and can be used as a drink or concentrated into a syrup by boiling off the water[1, 2, 11, 43, 34, 57, 142, 159]. The syrup is used as a sweetener on many foods. The sap can be harvested in late winter or early spring[[142], the flow is best on a warm sunny day after a frost. Trees on southern slopes in sandy soils give the best yields. It is best to make a hole about 7cm deep and about 1.3 metres above the ground[171]. Yields of 40 - 100 litres per tree can be obtained[142]. The best sap production comes from cold-winter areas with continental climates. Seed - boiled then roasted[62, 105, 159]. The seed is about 6mm long and is produced in small clusters[82]. Inner bark - cooked. It is dried, ground into a powder and then used as a thickening in soups etc or mixed with cereals when making bread[105, 161].

tcanta Fuel Preservative WoodThe leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. Wood - close grained, tough, hard, heavy. Used for furniture, ship building, etc[43, 46, 61, 82, 171]. It is a good fuel[82]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta AstringentA decoction of the inner bark has been used in the treatment of diarrhoea[257].

nrakta Eastern N. America - Quebec to Alabama, west to South Dakota and Arkansas. ksacta Rich calcareous or alluvial woods[43]. Found in a variety of soil types, near streams, rivers and in rich woodlands, usually below 750 metres but up to 1650 metres in the south of its range[229].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. A lot of the seed is non-viable, it is best to cut a few open to see if there is an embryo[113]. An average of 95% germination can be achieved from viable seed[98]. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate, sometimes taking two years[125]. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter.

Use: Specimen, Street tree. Of easy cultivation, it prefers a good moist well-drained soil but succeeds on most soils[11, 98]. Chlorosis can often develop as a result of iron deficiency when the plants are grown in alkaline soils, but in general maples are not fussy as to soil pH. Grows well in heavy clay soils. Trees need full light and a lot of space[98]. Plants are hardy to about -45°C when fully dormant[160]. This species is not a great success in Britain[1], though it does better than once thought[11]. It grows well in Cornwall[59]. Slow growing when young[11]. Plants produce prodigious root growth but very little top growth in first year from seed[133]. Trees grow rapidly for their first 25 years in the wild, but then slow down and only occasionally surviving for more than 200 years[229]. A very ornamental tree[1] but a bad companion plant, inhibiting the growth of nearby plants[18, 20]. This species is commercially exploited in America for its sap[1, 11]. Along with *A. saccharum* and the sub-species *A. s. grandidentatum* it is the major source of maple syrup[11]. There are some named varieties[183]. The sap can be tapped within 10 - 15 years from seed but it does not flow so well in areas with mild winters[160]. Special Features: North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2].

5.2.46 *Juglans ailanthifolia cordiformis*

Heartseed Walnut

4 tin 8 cyuc 4 kcak 4 tcan 1 dwat 20 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
lwis hpa7tmwatli fyif hjonli

Juglans ailanthifolia cordiformis is a deciduous Tree growing to 20 m (65ft) by 15 m (49ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in June. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

Edible Uses: Leaves Oil Seed Edible Uses: Oil Seed - raw or cooked[183]. They are also used in sweets, pies etc[183]. A mild and pleasant flavour, they can be eaten in quantity for dessert[183]. The shell is thin and easily cracked[117]. It is considered to be superior in taste to *C. ailanthifolia*. An edible oil is obtained from the seed[183], though it tends to go rancid quickly. Young buds (leaf?) and peduncles - cooked[105, 177].

Dye Herbicide Oil Tannin Wood A brown dye is obtained from the seed husks and the bark[61]. Rich in tannin, it does not require a mordant. The bark is rich in tannin. It is used as a dye and also medicinally[178]. Plants produce chemicals which can inhibit the growth of other plants. These chemicals are dissolved out of the leaves when it rains and are washed down to the ground below, reducing the growth of plants under the tree[18, 20, 159]. The roots of many members of this genus produce substances that are toxic to many plant species, especially apples (*Malus* species), members of the Ericaceae, *Potentilla* spp and the white pines (certain *Pinus* spp.)[200]. Wood - soft, light, not easily cracked, of good quality. Used for cabinet making etc[46, 61].

Anthelmintic Astringent Diuretic Kidney Lithontripic Pectoral Skin Tonic The bark is anthelmintic, astringent, diuretic, lithontripic, pectoral, skin, tonic (kidneys)[178].

Asia - Japan. ksacta Forests[11].

The seed is best sown as soon as it is ripe in individual deep pots in a cold frame[80]. You need to protect it from mice, birds, squirrels etc. The seed usually germinates in late winter or the spring. Plant out the seedlings into their permanent positions in early summer and give some protection from the cold for their first winter or two. The seed can also be stored in cool moist conditions (such as the salad compartment of a fridge) over the winter and sown in early spring but it may then require a period of cold stratification before it will germinate[78, 80].

Management: Standard Other Systems: Strip intercrop Regional Crop Staple Crop: Protein-oil Requires a deep well-drained loam and a sunny position sheltered from strong winds[1, 11]. Prefers a slightly alkaline soil[200]. This is the hardest member of the genus[63], it should succeed outdoors in most parts of the country. It is also resistant to most insects[160]. The young growth in spring, however, can be damaged by late frosts. This is a form of *C. ailanthifolia* with a thinner shell and a better tasting nut. It is cultivated for its edible seed in Japan and has the potential for producing very superior nuts, especially if hybridized with *J. cinerea*[117, 160]. There are some named varieties[183]. Plants can come into bearing in 3 - 4 years from seed[63]. Even when grown on a very windy site in Cornwall, the plants flowered in their eighth year from seed (by which time they were more sheltered from the wind)[K] Plants produce a deep taproot and they are intolerant of root disturbance[1, 11]. Seedlings should be planted out into their permanent positions as soon as possible and then given some protection since they are somewhat tender when young[1, 11]. Flower initiation depends upon suitable conditions in the previous summer[200]. The flowers and young growths can be destroyed by even short periods down to -2°C, but fortunately plants are usually late coming into leaf[200]. Any pruning should only be carried out in late summer to early autumn or when the plant is fully dormant otherwise wounds will bleed profusely and this will severely weaken the tree[200]. Trees have a dense canopy which tends to reduce plant growth below them[K]. We have no specific information for this species, but the roots of several members of this genus produce substances that are toxic to many plant species, especially apples (*Malus* species), members of the Ericaceae, *Potentilla* spp and the white pines (certain *Pinus* spp.)[200]. The leaves of many species also secrete substances that have an inhibitory effect on plants growing underneath them. All in all this is not a very good companion plant[K]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

5.2.47 *Aesculus flava*

Sweet Buckeye, Yellow buckeye

4 tin 8 cyuc 4 kcak 0 tcan 0 dwat 20 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
lwis hpa7tmwatli xre7t hjonli

Aesculus flava is a deciduous Tree growing to 20 m (65ft) by 8 m (26ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

The seed is rich in saponins. Although poisonous, saponins are poorly absorbed by the human body and so most pass through without harm. Saponins are quite bitter and can be found in many common foods such as some beans. They can be removed by carefully leaching the seed or flour in running water. Thorough cooking, and perhaps changing the cooking water once, will also normally remove most of

them. However, it is not advisable to eat large quantities of food that contain saponins. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K].

kcakta Edible Parts: Nectar SeedEdible Uses: Seed - cooked. Said to be as sweet as a chestnut[105, 177]. We have only eaten the immature seed, harvested in late August, but these were very tasty with no noticeable bitterness[K]. The seed can be up to 45mm in diameter and is easily harvested[82]. It can be dried, ground into a flour and used as a gruel. The seed contains saponins and needs to be leached of these toxins before it becomes safe to eat - the North American Indians would do this by slow-roasting the nuts (which would have rendered the saponins harmless) and then cutting them into thin slices, putting them into a cloth bag and rinsing them in a stream for 2 - 5 days[213, 229]. The resulting product is said to be tasty and nutritious[229], though most of the minerals etc would have been leached out[K]. The flowers contain a sweet nectar which is delicious when sucked out[245].

tcanta Soap WoodSaponins in the seed are used as a soap substitute[169]. The saponins can be easily obtained by chopping the seed into small pieces and infusing them in hot water. This water can then be used for washing the body, clothes etc. Its main drawback is a lingering odour of horse chestnuts[K]. Wood - very soft, light, close grained, difficult to split. It weighs 27lb per cubic foot[235]. It is used for making artificial limbs, wooden ware, pulp etc, and is occasionally sawn into lumber[46, 62, 82, 171].

nrakta Eastern N. America - Pennsylvania to Tennessee and west to Ohio. ksakta Rich river-bottoms and mountain slopes[82]. Woodland on moist rich soils[43]

propta Seed - best sown outdoors or in a cold frame as soon as it is ripe[11, 80]. The seed germinates almost immediately and must be given protection from severe weather[130]. The seed has a very limited viability and must not be allowed to dry out. Stored seed should be soaked for 24 hours prior to sowing and even after this may still not be viable[80, 113]. It is best to sow the seed with its 'scar' downwards[130]. If sowing the seed in a cold frame, pot up the seedlings in early spring and plant them out into their permanent positions in the summer.

nwatta Landscape Uses:Pest tolerant, Pollard, Specimen. Prefers a deep loamy well-drained soil but is not too fussy[1, 11]. Grows best in eastern and south-eastern areas of England probably needing a continental climate in order to thrive[126, 200]. Although the trees are very hardy when dormant, the new growth can be damaged by late spring frosts[11]. Plants grow well in a woodland situation, tolerating shading by larger trees[229]. Seedlings grow away quickly, the plants reaching maturity when about 60 - 80 years old[229]. The form *Asculus flava vestita* (Sarg.)Fern. is growing well at Kew Gardens. It has been seen with large crops of fruit on a number of occasions, even in cooler summers. These fruits have only been tried when immature (harvested at the end of August) but were then very tasty with no bitterness[K]. Fruits are produced more abundantly in warm summers[130]. Most members of this genus transplant easily, even when fairly large[11]. Special Features:Attractive foliage, North American native, Blooms are very showy.

5.2.48 *Pinus albicaulis*

White-Bark Pine

4 tlin 8 cyuc 4 kcak 3 tcan 2 dwat 20 m hku
htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli flatprik hpa7tmwatli dyat hjonli

drutta *Pinus albicaulis* is an evergreen Tree growing to 20 m (65ft 7in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in leaf all year, in flower from May to June, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].

kcakta Edible Parts: Inner bark SeedEdible Uses: CondimentSeed - raw or cooked[226]. They can also be ground into a powder and then used as a flavouring in soups etc or can be added to cereal flours when making bread, biscuits, cakes etc[226]. Large and sweetly-flavoured, the oil-rich seed is up to 9 x 7mm[200] and has a thick shell[82]. It has a pleasant slightly resinous flavour[K]. Eating the raw seeds in quantity can cause constipation[257]. Inner bark[161, 177, 257]. There are no more details but inner bark is often dried, ground into a powder and then used as a thickener in soups etc or added to cereals when making bread. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Dye Herbicide WoodA tan or green dye is obtained from the needles[168]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. Wood - soft, light, coarse grained, brittle[82]. Used occasionally for fuel[229].

dwatta The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge[4]. It is a valuable remedy used internally in the treatment of kidney and bladder complaints and is used both internally and as a rub and steam bath in the treatment of rheumatic affections[4]. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and TB[4]. Externally it is a very beneficial treatment for a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers[4].

nrakta Western N. America - British Columbia to California. ksakta Often found on rocky ridges and bluffs, it is reduced to a prostrate gnarled mat at the highest elevations and exposures, but the best specimens are found at lower elevations in sheltered canyons[229]

propta It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed[80]. Plant seedlings out into their permanent positions as soon as possible and protect them for their first winter or two[11]. Plants have a very sparse root system and the sooner they are planted into their permanent positions the better they will grow[K]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm[200]. We actually plant them out when they are about 5 - 10cm tall. So long as they are given a very good weed-excluding mulch they establish very well[K]. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Cuttings. This method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

nwatta Landscape Uses:Specimen. Thrives in a light well-drained sandy or gravelly loam in a sunny position[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. Plants often colonise exposed mountain slopes in the wild, their root system anchoring them firmly[226]. A long-lived but slow-growing tree in the wild[229]. It grows well in Britain[81], coning regularly at Kew[11], but not doing so well in the milder parts of the country[120]. It is best suited for growing in northern areas at higher elevations[120]. Trees do not produce large num-

bers of cones but small numbers are formed annually[229]. The cones are up to 8cm long, they ripen in late summer and do not open on the tree but fall intact to the ground[81, 82, 200, 226]. This species is the only N. American pine with this habit and it is thus considered to be a primitive species[226]. The seed is extracted by breaking up the soft scales of the cone[200]. Birds and mammals often open the cones and eat the seeds before they mature[1]. Leaf secretions inhibit the germination of seeds, thereby inhibiting the growth of other plants below the tree[18]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. This species is closely related to *P. flexilis*[11], differing mainly in the cones[226]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Attracts birds, North American native, Inconspicuous flowers or blooms. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. An evergreen. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.2.49 *Pinus koraiensis*

Korean Nut Pine, Chinese pinenut
4 tlin 7 cyuc 4 kcaak 3 tcan 2 dwat 20 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli flatprik hpa7tmwatli dyat hjonli

drutta *Pinus koraiensis* is an evergreen Tree growing to 20 m (65ft 7in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf all year, in flower in May, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].

kcakta Edible Parts: Oil Seed Edible Uses: Condiment Oil Seed - raw or cooked. Rich in oil[2, 11, 46, 63, 74, 81]. A soft texture with a hint of resin in the flavour, it makes a delicious snack and can also be used as a staple food[K]. The seed can also be dried and ground into a powder then used as a flavouring and thickener in soups etc[183]. Fairly large, the seeds are up to 16mm x 12mm[200]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Dye Herbicide Oil Resin Tannin Wood A tan or green dye is obtained from the needles[168]. The seeds are a source of soap and lubricating oil[266]. Tannin is obtained from the bark[266]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. Yields turpentine and tar[74]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. Wood. Used for construction and carpentry[74, 81]. The timber is used for construction, bridge building, vehicles, furniture, and wood pulp[266].

dwatta Analgesic Antibacterial Antiinflammatory Galactogogue Poulitce The seed contains several medically active compounds and is analgesic, antibacterial and antiinflammatory[279]. It is used in Korea in the treatment of earache, epistaxis and to promote milk flow in nursing mothers[279].

The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge[4]. It is a valuable remedy used internally in the treatment of kidney and bladder complaints and is used both internally and as a rub and steam bath in the treatment of rheumatic affections[4]. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and TB[4]. Externally it is a very beneficial treatment for a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers[4]. The stem bark is used in the treatment of burns and skin ailments[218].

nrakta E. Asia - China, Korea, Manchuria, Siberia. ks-acta Dry mountain slopes, especially those facing north, to 2600 metres[74, 120].

propta It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed[80]. Plant seedlings out into their permanent positions as soon as possible and protect them for their first winter or two[11]. Plants have a very sparse root system and the sooner they are planted into their permanent positions the better they will grow[K]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm[200]. We actually plant them out when they are about 5 - 10cm tall. So long as they are given a very good weed-excluding mulch they establish very well[K]. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Cuttings. This method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

nwatta Management: Standard Minor Global Crop Other Systems: Irreg. Intercrop Staple Crop: Protein-oil Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. This species prefers a cool moist climate[81]. Leaf secretions inhibit the germination of seeds, thereby inhibiting the growth of other plants below the tree[18]. This species is sometimes cultivated for its edible seed, there are some named varieties[183]. It is one of the main species utilized for its edible seeds[200], being gathered from cultivated and wild trees. Large quantities of the seeds are exported as a food crop from N. China[183]. Plants bear cones when they are 3.5 metres tall in Cornwall[59]. Trees are slow growing when young[11, 81]. Growth in the south-east of Britain is generally poor but trees in the west and north are healthy and growing well with average annual height increases of around 25cm and girth increases of 3cm or more[185]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. The cones do not open, seed is extracted by breaking up the soft scales of the cone[200]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. An evergreen. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.2.50 Morus alba

White Mulberry, Common Mulberry,

4 tin 9 cyuc 4 kcaak 4 tcan 3 dwat 18 m hkcuc

hmmihtpu cyutli hgattcup hwicli hrasjutnyik hpa7tli flatprikli-wis hpa7tmwatli fyif hjonli

drutta Morus alba is a deciduous Tree growing to 18 m (59ft) by 10 m (32ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in May, and the seeds ripen from July to August. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista One report suggests that the raw fruit contains hallucinogens[62]. This fruit is frequently eaten in various parts of the world, there are even some named varieties, and no such effects have been mentioned elsewhere, nor observed by the writer when he has eaten the fruit. Possibly the unripe fruit was being referred to in the report, though even this would be surprising[K].

kcakta Edible Parts: Fruit Inner bark Leaves Manna Shoots Edible Uses: TeaFruit - raw[2, 7, 158]. A sweet taste, but the fruit is usually insipid[3, 11]. It contains about 1.5% protein, 0.5% fat, 8% carbohydrate, 0.7% malic acid[179]. Fruits of the cultivar 'Pendulum' tried at Kew in July 1994 had a pleasant flavour[K]. A richer flavour develops if the fruit is dried, it can then be used as a raisin substitute. The fruit is up to 25mm long[200]. Some caution is advised, see the notes above on toxicity. Per 100 g, the fruit is reported to contain 87.5 g water, 1.5 g protein, 0.49 g fat, 8.3 g carbohydrates, 1.4 g fiber, 0.9 g ash, 80 mg Ca, 40 mg P, 1.9 mg Fe, 174 IU vit. A, 9 ?g thiamine, 184 µg riboflavin, 0.8 mg nicotinic acid, and 13 mg ascorbic acid. Young leaves and shoots - cooked[105, 183]. A famine food, used when all else fails[177]. The leaf makes a good vegetable, it is rich in carotene and calcium[179]. Protein preparations from young mulberry leaves form an excellent supplement to protein-deficient diets[269]. The dry leaves contain 18 - 28.8% protein, 0.2 - 0.7% Magnesium, 0.8 - 13.6% soluble sugars, 0.6 - 1.4% phosphorus, 2 - 3.9% potassium, 1.4 - 2.4% calcium, 0.8 - 1.8% aluminium, 0.05 - 0.26% iron, 1.8 - 2.6% silica, and 0.3 - 0.56% sulphur[269]. The leaf also contains 10% tannin[179]. Inner bark - roasted and ground into a meal then used as a thickener in soups etc or mixed with cereals when making bread. A famine food, used when all else fails[179]. The tree is said to be a source of an edible manna[183]. Young shoots can be used as a tea substitute[183].

tcanta Biomass Dye Fibre Fodder Shelterbelt Tannin WoodA fibre is obtained from the bark of one-year old stems, it is used in weaving clothes etc[7, 74, 266]. The stem bark is fibrous and is used in China and Europe for paper making[266, 269]. The twigs are used as binding material and for making baskets[269]. A brown dye is obtained from the trunk[178]. The leaves contain 10% tannin[179]. This tree can be grown as a part of a shelterbelt. The cultivar 'Tartarica' has been especially mentioned[200], it is very suitable for northern latitudes and is much used as a shelterbelt in Russia[269]. The wood of the mulberry is a potentially excellent source of ethanol, with yields of up to 6% from sawdust treated with acid and then given four days incubation[269]. Wood - light to moderately heavy, hard, durable, fine and close-grained, though it shows a tendency to warp. Due to its elasticity and flexibility when steamed, it is valued for making sports equipment such as tennis rackets and cricket bats, being considered as good as ash (Fraxinus excelsior)[238, 269]. It is also used for boat building, furniture, agricultural implements etc[145, 149, 158, 269]. It furnishes a medium grade fuel wood[269].

dwatta Analgesic Anthelmintic Antiasthmatic Antibacterial Antirheumatic Antitussive Astringent Diaphoretic Diuretic Emollient Expectorant Hypoglycaemic Hypotensive Odontalgic Ophthalmic Pectoral Purgative Sedative Tonic UrinaryThe white mulberry has a long history of medicinal use in Chinese medicine, almost all parts of the plant are used in one way or another[238]. Recent research has shown improvements in elephantiasis when treated with leaf extract injections and in tetanus following oral doses of

the sap mixed with sugar[238]. The leaves are antibacterial, astringent, diaphoretic, hypoglycaemic, odontalgic and ophthalmic[176, 218, 238]. They are taken internally in the treatment of colds, influenza, eye infections and nosebleeds[176, 238]. An injected extract of the leaves can be used in the treatment of elephantiasis and purulent fistulae[176]. The leaves are collected after the first frosts of autumn and can be used fresh but are generally dried[238]. The stems are antirheumatic, antispasmodic, diuretic, hypotensive and pectoral[176, 218, 238]. They are used in the treatment of rheumatic pains and spasms, especially of the upper half of the body, high blood pressure[176]. A tincture of the bark is used to relieve toothache[7]. The branches are harvested in late spring or early summer and are dried for later use[238]. The fruit has a tonic effect on kidney energy[218, 238]. It is used in the treatment of urinary incontinence, dizziness, tinnitus, insomnia due to anaemia, neurasthenia, hypertension, diabetes, premature greying of the hair and constipation in the elderly[176, 238]. The root bark is antiasthmatic, antitussive, diuretic, expectorant, hypotensive and sedative[176, 238]. It is used internally in the treatment of asthma, coughs, bronchitis, oedema, hypertension and diabetes[176, 238]. The roots are harvested in the winter and dried for later use[238]. The bark is anthelmintic and purgative, it is used to expel tape worms[240]. Extracts of the plant have antibacterial and fungicidal activity[218].

nrakta E. Asia - central and northern China. ksacta Not known in a truly wild situation.

propta The seed germinates best if given 2 - 3 months cold stratification[80, 98]. Sow the seed as soon as it is ripe if possible, otherwise in February in a cold frame. The seed usually germinates in the first spring, though it sometimes takes another 12 months. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the cold frame for their first winter. Plant them out in late spring or early summer after the last expected frosts. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Plant out in spring. A good percentage take, though they sometimes fail to thrive[78, 113]. Cuttings of mature wood of the current season's growth, 25 - 30cm with a heel of 2 year old wood, autumn or early spring in a cold frame or a shady bed outside[78, 113, 200]. Bury the cuttings to threequarters of their depth. Layering in autumn[200].

nwatta Agroforestry Services: Contour hedgerow Agroforestry Services: Living fence Fodder: Bank Fodder: Insect Industrial Crop: Biomass Management: Coppice Management: Standard Minor Global Crop Other Systems: Dyke-pondLandscape Uses:Pest tolerant, Aggressive surface roots possible, Pollard. Succeeds in a variety of soils[269], though it prefers a warm well-drained loamy soil in a sunny position[1, 11]. Plants are fairly wind-resistant[200], though the branches are often killed back when growing in strong maritime exposure[K]. At least some cultivars are drought resistant, the form 'Tatarica' has been especially mentioned[183]. The white mulberry is occasionally cultivated for its edible fruit, there are a number of varieties[183] and sub-species varying greatly in the quality of their fruit. The form *M. alba multicaulis* (Perretot.)Loud. (synonym *M. multicaulis* Perretot.) has been especially mentioned for its fruit[105]. The cultivars 'Nana' and 'Fegyvernekiana' are dwarf forms only making shrub size[182]. The cultivar 'Pendulum' was seen growing at Kew in July 1994 with a heavy crop of tasty fruits, the first of which were just ripening[K]. Mulberries have brittle roots and so need to be handled with care when planting them out[238]. Any pruning should only be carried out in the winter when the plant is fully dormant because mulberries bleed badly when cut[238]. Ideally prune only badly placed branches and dead wood[238]. This is a good tree for growing grapes into[20]. The grapes are difficult to pick but always seem to be healthier and free from fungal diseases[201]. Plants in this genus are notably resistant to honey fungus[200]. Special Features:Not North American native, Naturalizing, There are no flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For especially

Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

5.2.51 Sorbus latifolia

French Hales

4 tlin 8 cyuc 4 kcaok 0 tcan 0 dwat 14 m hkuc
hmmimhtut cyutli tcup hwicli hrasjltunyk hpa7tli flatprikrlwis
hpa7tmwatli fyfjre7t hjonli

drutta Sorbus latifolia is a deciduous Tree growing to 14 m (46ft) by 10 m (32ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects, Apomictic (reproduce by seeds formed without sexual fusion). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista The seeds probably contain hydrogen cyanide. This is the ingredient that gives almonds their characteristic flavour. Unless the seed is very bitter it should be perfectly safe in reasonable quantities. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

ckakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[183]. The fruit is usually bletted if it is going to be eaten raw[K]. This involves storing the fruit in a cool dry place until it is almost but not quite going rotten. At this stage the fruit has a delicious taste, somewhat like a luscious tropical fruit. The fruit is up to 1.5cm across[200] and is borne in bunches which makes harvesting easier[K].

nraکتa Europe - France. ksacta Only found in the forest of Fontainebleau[11].

propta Seed - best sown as soon as it is ripe in a cold frame[78, 80]. If you have sufficient seed it can be sown in an outdoor seedbed[78, 80]. Stored seed germinates better if given 2 weeks warm then 14 - 16 weeks cold stratification[98], so sow it as early in the year as possible. Prick out the seedlings into individual pots when they are large enough to handle. Seedlings are very slow to put on top-growth for their first year or two[11], but they are busy building up a good root system. It is best to keep them in pots in a cold frame for their first winter and then plant them out into their permanent positions in late spring.

nwatta Succeeds in most reasonably good soils in an open sunny position[11]. Tolerates light shade[188], though it fruits better in a sunny position[K]. Plants are susceptible to fireblight[188]. Probably of hybrid origin with S. torminalis as one parent and S. aria or a species from that complex as the other parent[11]. The trees usually have apomictic flowers. They thus produce seed asexually, each seedling being a clone of the parent[11].

5.2.52 Akebia quinata

Akebia, Chocolate vine, Fiveleaf Akebia, Chocolate Vine

4 tlin 8 cyuc 4 kcaok 3 tcan 2 dwat 12 m hkuc
pcimhmimhtut cyutli tcup hwicli hrasjltunyk hpa7tli flatprikrlwis
hpa7tmwatli dyat hjonli

drutta Akebia quinata is a deciduous Climber growing to 12 m (39ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to May, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic

(mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

ckakta Edible Parts: Fruit Leaves Edible Uses: Tea Fruit - raw[2, 105, 177]. Sweet but insipid[3]. The fruit has a delicate flavour and a soft, juicy texture[K]. Lemon juice is sometimes added to the fruit to enhance the flavour[183]. The bitter skin of the fruit is fried and eaten[183]. The fruit is 5 - 10cm long and up to 4m wide[200, 266]. Soft young shoots are used in salads or pickled[183]. The leaves are used as a tea substitute[105, 177, 183].

tcanta Basketry The peeled stems are very pliable and can be used in basket making[174]. Plants have sometimes been used as a ground cover, but their method of growth does not really lend themselves to this use[208]. Scented Landscape Uses: Arbor.

dwatta Anodyne Antiphlogistic Bitter Cancer Contraceptive Depurative Diaphoretic Diuretic Emmenagogue Febrifuge Galactagogue Laxative Resolvent Stimulant Stomachic Urinary Vulnerary The stems are anodyne, antinfungal, antiphlogistic, bitter, diaphoretic, diuretic, emmenagogue, febrifuge, laxative, galactagogue, resolvent, stimulant, stomachic and vulnerary[174, 178, 218, 238]. Taken internally, it controls bacterial and fungal infections and is used in the treatment of urinary tract infections, lack of menstruation, to improve lactation etc[238]. The stems are harvested in the autumn and dried for later use[238]. The fruit is antirheumatic, depurative, diuretic, febrifuge, stomachic and tonic[218]. It is a popular remedy for cancer[218]. The root is febrifuge[218]. The plant was ranked 13th in a survey of 250 potential antifertility plants in China[218].

nraکتa E. Asia - China, Japan, Korea. ksacta Woods, hedges and thickets in mountainous areas[58]. Forest margins along streams, scrub on mountain slopes at elevations of 300 - 1500 metres in China[266].

propta Seed - best sown in a cold frame as soon as it is ripe. Surface sow in a light position[133]. The seed usually germinates in 1 - 3 months at 15°C[133]. Stored seed should be given 1 month cold stratification[113, 133] and can be very difficult to germinate. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. Plant out in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, July/August in a frame[11, 113]. The cuttings can be slow to root[200]. Cuttings can also be taken of soft wood in spring[113]. Root cuttings, December in a warm greenhouse[113]. Layering in early spring[1]. Very easy, the plants usually self-layer and so all you need to do is dig up the new plants and plant them out directly into their permanent positions.

nwatta Requires a well-drained moisture retentive soil[200]. Prefers a good loamy soil[11]. Succeeds in acid or alkaline soils[200]. Prefers partial shade but succeeds in full sun[3, 200]. Succeeds on north facing walls[219]. Plants are fast growing and can be invasive[200]. Dormant plants are hardy to about -20°C but they can be somewhat tender when young[200]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. This species grows very well in S.W. England[113]. Plants are evergreen in mild winters[11]. Resentful of root disturbance, either grow the plants in containers prior to planting them out or plant them out whilst very young[219]. Plants are not normally pruned, if they are growing too large they can be cut back by trimming them with shears in early spring[202]. The flowers have a spicy fragrance, reminiscent of vanilla[219]. Plants are shy to fruit, they possibly require some protection in the flowering season, hand pollination is advisable[3, 11]. Plants are probably self-sterile[11, 182], if possible at least 2 plants should be grown, each from a different source. Plants in this genus are notably resistant to honey fungus[200]. Special Features: Not North American native, Fragrant flowers, Attractive flowers or blooms. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out. The root pattern is suckering with new plants from underground runners away from the plant [2-1].

5.2.53 Crataegus holmesiana

Holmes' hawthorn

4 tin 8 cyuc 4 kcaok 0 tcan 2 dwat 10 m hkuc
hmmihtut cyutli hgattcuphja7n hwicli hrsajlutnykfrip hpa7tli
flatpriklwisslip hpa7tmwatli xre7t hjonli

drutta Crataegus holmesiana is a deciduous Tree growing to 10 m (32ft) by 8 m (26ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked. An excellent dessert fruit, it has an acid yet sweet flavour, is juicy but with a mealy texture, it makes very pleasant eating[K]. Some forms have fruits with a disagreeable flavour[82]. The fruit can also be used in making pies, preserves etc, and can be dried for later use. The fruit is about 10mm in diameter[200]. A specimen at Cambridge Botanical garden has fruits up to 20mm in diameter[K]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiac HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern N. America - Ontario to Maine, south to New York and Pennsylvania. ksacta Rich moist hillsides and the borders of streams and swamps[82].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hawthorns in general hybridize freely with other members of the genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish.

This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A very ornamental plant[11].

5.2.54 Prunus cerasifera divaricata

4 tin 8 cyuc 4 kcaok 0 tcan 1 dwat 10 m hkuc
hmmihtut cyutli tcup hwicli hrsajlutnykfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta Prunus cerasifera divaricata is a deciduous Tree growing to 10 m (32ft 10in). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit SeedEdible Uses: Fruit - raw or cooked[74]. Tastes like a Mirabelle plum[2, 11]. A very pleasant plum-like flavour when fully ripe with a mealy though juicy flesh[K]. It is high in citric acid, containing about 4.7%[74]. The fruit is about 30mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta Dye RootstockUsed as a rootstock for plums, peaches and apricots[74]. A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168].

dwatta Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta S.E. Europe to W. Asia. ksacta Mountain slopes in woody or shrubby thickets, on stony slopes, ravine bottoms, near water and montane river valleys to 2000 metres[74].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Requires a well-drained moisture retentive soil[11, 200]. Succeeds in light shade but fruits better in a sunny position[11, 200]. Thrives in a loamy soil, doing well on limestone[11]. Grows well in heavy clay soils. Prefers some chalk in the soil but apt to become chlorotic if too much is present[1]. Plants are hardy to about -25°C[184]. According to some botanists this plant should be named *P. divaricata* and *P. cerasifera* should be named *P. divaricata cerasifera*[11]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200].

5.2.55 Crataegus douglasii

Black Hawthorn

4 tlin 8 cyuc 4 kcaok 0 tcan 2 dwat 9 m hkuc
pimhmhtut cyutli hgattcupha7n hwicli hrasjlutnyikfrp hpa7tli
flatprikliwslip hpa7tmwatli xre7t hjonli

drutta Crataegus douglasii is a deciduous Tree growing to 9 m (29ft 6in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[2, 3, 95, 99, 101]. A very pleasant flavour with a sweet and juicy succulent flesh[46, 82, K], it makes an excellent dessert fruit and can be eaten in quantity[K]. The fruit can also be used for making pies, preserves etc, and can be dried for later use[183]. The fruit is about 8mm in diameter and is borne in small clusters[200]. The fruits I have eaten have been considerably larger than this[K]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Needles WoodThe spines on the branches are used as needles for lancing boils, removing splinters etc[99]. Wood - close-grained, heavy, hard and tough. Used for tool handles etc[82, 99, 101].

dwatta Antirheumatic Astringent Cardiotonic Dysentery Hypotensive Poultice StomachicAn infusion of the shoots has been used to treat diarrhoea in children and sores in babies' mouths[257]. A poultice of the chewed leaves has been applied to swellings[257]. An infusion of the bark has been used in the treatment of diarrhoea and dysentery[257]. An infusion of the sapwood, bark and roots has been used as a stomach medicine[257]. The thorns have been used as a treatment for arthritis[257]. The point of the thorn was used to pierce an area affected by arthritic pain. The other end of the thorn was ignited and burned down to the point buried into the skin. This treatment was very painful but it was said that after a scab had formed and disappeared, the arthritic pain had also disappeared[257]. The thorns have been used as probes for boils and ulcers[257]. Although no other specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Western N. America - British Columbia to Michigan, south to California. ksacta Open woods, banks of mountain streams and on rocky banks[43, 82].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but

undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

5.2.56 Schisandra chinensis

Magnolia Vine, Wu Wei Zi

4 tlin 8 cyuc 4 kcaok 2 tcan 5 dwat 9 m hkuc
pimhmim cyutli tkcup hwicli hrasjlutnyik hpa7tli flatprikliwslip
hpa7tmwatli nyanhjen hjonli

drutta Schisandra chinensis is a deciduous Climber growing to 9 m (29ft 6in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from April to May, and the seeds ripen from August to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: Fruit LeavesEdible Uses: GumFruit - raw or cooked[183]. Usually dried and used on journeys, it is very sustaining[74]. Rich in sugars[74], it has a sweet/sour flavour[178]. In Russia a paste made from the fruit is mixed with Actinidia arguta in order to counteract the insufficient acidity of that species[183]. The fruit is about 6mm in diameter and is borne in a grape-like bunch about 10cm long[200]. Young leaves - cooked and used as a vegetable[105, 177, 183].

tcanta Gum Hair Size WoodA viscid mucoid material is obtained from the fruit and the branches, it is used as a size for paper and as a hair dressing[178]. The dried wood is charmingly fragrant[11].

dwatta Antirheumatic Antitussive Aphrodisiac Astringent Cancer Cardiotonic Cholagogue Dysentery Expectorant Hepatic Lenitive Nervine Pectoral Sedative Stimulant Tonic UrinaryWu Wei Zi is commonly used in Chinese herbalism, where it is considered to be one of the 50 fundamental herbs[218]. It is an excellent tonic and restorative, helping in stressful times and increasing zest for life[254]. It is considered to be a substitute for ginseng and is said to be a tonic for both the male and the female sex organs[238]. The fruit is antitussive, aphrodisiac, hepatic, astringent, cardiotonic, cholagogue, expectorant, hypotensive, lenitive, nerve, pectoral, sedative, stimulant and tonic[174, 176, 178, 218]. Low doses of the fruit are said to stimulate the central nervous system whilst large doses depress it[218]. The fruit also regulates the cardiovascular system[218]. It is taken internally in the treatment of dry coughs, asthma, night sweats, urinary disorders, involuntary ejaculation, chronic diarrhoea, palpitations, insomnia, poor memory, hyperacidity, hepatitis and diabetes[238]. Externally, it is used to treat irritating and allergic skin conditions[238]. The fruit is harvested after the first frosts and sun-dried for later use[238]. The fruit contains lignans[254]. These have a pronounced protective action on the liver. In one clinical trial there was a 76% success rate in treating patients with hepatitis, no side effects were noticed[254]. The seed is used in the treatment of cancer[218]. The plant is antirheumatic[218]. A mucilaginous decoction obtained from the branches is useful in the treatment of coughs, dysentery and gonorrhoea[218].

nrakta E. Asia - China, Japan, Korea. ksacta Mixed forests, especially on the margins, also by streams and brooks, usually on sandy soils[74].

propta Seed - best sown in the autumn in a cold frame[200, 238]. Pre-soak stored seed for 12 hours in warm water and sow in a greenhouse in the spring[238]. Germination can be slow and erratic. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in the greenhouse for their first 2 years. Plant them out into their permanent positions in early summer. Cuttings of half-ripe wood, 5 - 8cm with a heel, August in a frame. Overwinter in the greenhouse and plant out in late spring[11, 78]. Good percentage[78]. Layering of long shoots in the autumn[200].

nwatta Prefers a rich well-drained moisture retentive soil[11, 200]. Prefers a slightly acid soil but tolerates some alkalinity if plenty of organic matter is added to the soil[200]. Requires some protection from the most intense sunlight[200]. Plants succeed in quite deep shade and are suitable for north-facing walls[219]. Plants are intolerant of drought[K]. The fully dormant plant is hardy to about -17°C, though the young growth in spring can be damaged by late frosts. Plants climb by twining around supports. Any pruning is best carried out in the spring[219]. The flowers are sweetly scented[245]. The leaves are also aromatic[245]. Dioecious. Male and female plants must be grown if seed is required. The plant is heat tolerant in zones 9 through 7. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Growth habit is a single or multiple shooting vine from a crown [1-2].

5.2.57 *Akebia x pentaphylla*

4 tlin 8 cyuc 4 kcak 0 tcan 0 dwat 9 m hkuc
pcimhmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flat-prikwis hpa7tmwatli hjonli

drutta *Akebia x pentaphylla* is a deciduous Climber growing to 9 m (29ft 6in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in April, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: TeaFruit - raw[200]. Sweet but insipid. The fruit has a delicate flavour and a soft juicy texture[K]. The flavour can be enhanced by the addition of a little lemon juice. Valued as a novelty, it looks somewhat like a deep-purple coloured sausage. The dried young leaves are a tea substitute.

tcanta BasketryThe peeled stems are very pliable. They can be bleached and used in basket making[46, 61].

nrakta E. Asia - Japan. ksacta Woods and thickets. A naturally occurring hybrid, *A. quinata* x *A. trifoliata*[200].

propta Seed - best sown in a cold frame as soon as it is ripe. Surface sow in a light position[133]. The seed usually germinates in 1 - 3 months at 15°C[133]. Stored seed should be given 1 month cold stratification[113, 133] and can be very difficult to germinate. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. Plant out in late spring or early summer, after the last expected frosts. This is a hybrid species and so it will not breed true from seed. Cuttings of half-ripe wood, July/August in a frame[11, 113]. The cuttings can be slow to root[200]. Cuttings can also be taken of soft wood in spring[113]. Root cuttings, December in a warm greenhouse[113]. Layering in

early spring[1]. Very easy, the plants usually self-layer and so all you need to do is dig up the new plants and plant them out directly into their permanent positions.

nwatta Requires a well-drained moisture retentive soil[200]. Succeeds in acid or alkaline soils[200]. Prefers partial shade but succeeds in full sun[200]. Succeeds on a north facing wall[219]. Dormant plants are hardy to about -15°C but they can be somewhat tender when young and are best given some protection at this time[200]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. Resentful of root disturbance, either grow plants in containers prior to planting them out or plant them out whilst very young[219]. A naturally occurring hybrid, *A. quinata* x *A. trifoliata*[200]. Plants are evergreen in mild winters[11, 200]. They are fast growing and can be invasive[200]. Plants are not normally pruned, if they are growing too large they can be cut back by trimming them with shears in early spring[202]. Shy to fruit, it possibly requires some protection in the flowering season - hand pollination is advisable. Plants are also possibly self-sterile. Plants in this genus are notably resistant to honey fungus[200].

5.2.58 *Crataegus acclivis*

4 tlin 8 cyuc 4 kcak 0 tcan 2 dwat 8 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli flatprikwislip hpa7tmwatli xre7t hjonli

drutta *Crataegus acclivis* is a deciduous Tree growing to 8 m (26ft) by 7 m (23ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to May, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[K]. The fruit ripens in early September, it is about 18mm long with a pleasantly sweet juicy flesh and makes an excellent dessert fruit[K]. The fruit contains up to 5 seeds in the centre, these usually stick together and so the effect is like eating a cherry with its single large seed[K].

dwatta Cardiac HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta North-eastern N. America - New York to the borders of southern Canada. ksacta Banks of streams and steep gorges[235].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but

undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Plants are hardy to at least -18°C[202]. We have very little specific information on this plant, and it is regarded as no more than a form of *C. pedicellata* by most botanists[235]. However, a tree seen at Kew in early September 1997 had a good crop of almost ripe fruit. This fruit was more elongated than *C. pedicellata* and was also ripe about 4 weeks before that species[K]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

5.2.59 *Crataegus submollis*

Quebec Hawthorn

4 tlin 8 cyuc 4 kcaak 0 tcan 2 dwat 7 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli
flatprikwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus submollis* is a deciduous Tree growing to 7 m (23ft) by 7 m (23ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[105, 161]. Sub-acid, dry and mealy[82]. Our experience has been that the fruit is sweet and somewhat juicy, it has a thick flesh with a nice flavour and makes an acceptable dessert fruit[K]. The fruit can also be used in making pies, preserves etc, and can be dried for later use[257]. It is about 20mm in diameter, is borne in large clusters and is easily harvested[K]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Hedge Hedge Plants are very tolerant of trimming and will soon resprout even if cut back into very old wood. They can be used as a hedge[50]. Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta North-eastern N. America - Quebec to Ontario, Massachusetts and New York. ksacta Wooded hillsides and open fertile ground[43]. Rich damp hillsides and the borders of woods and roads[82].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold

stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Plants are hardy to about -18°C[202]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. This species is sometimes confused with *C. coccinea*[50]. It is also very close to *C. mollis*, differing in having 10 stamens to a flower (as compared to 20 in *C. mollis*)[202]. It is considered to be part of *C. mollis* by some botanists[229].

5.2.60 *Cornus mas*

Cornelian Cherry, Cornelian Cherry Dogwood

4 tlin 8 cyuc 4 kcaak 3 tcan 2 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik-
wisslip hpa7tmwatli xre7t hjonli

drutta *Cornus mas* is a deciduous Shrub growing to 5 m (16ft) by 5 m (16ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from February to March, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Fruit Oil Oil Edible Uses: Coffee Oil Oil Fruit - raw, dried or used in preserves[2, 3, 7, 9, 13, 183]. Juicy, with a nice acid flavour[11]. The fully ripe fruit has a somewhat plum-like flavour and texture and is very nice eating, but the unripe fruit is rather astringent[K]. It is rather low in pectin and so needs to be used with other fruit when making jam[9]. At one time the fruit was kept in brine and used like olives[183]. The fruit is a reasonable size, up to 15mm long, with a single large seed[K]. A small amount of edible oil can be extracted from the seeds[7]. Seeds are roasted, ground into a powder and used as a coffee substitute[183].

tcanta Dye Hedge Hedge Oil Oil Tannin Wood An oil is obtained from the seed[7]. A dye is obtained from the bark[3, 7]. No more details are given. Another report says that a red dye is obtained from the plant, but does not say which part of the plant[4]. The leaves are a good source of tannin[7]. Wood - very hard, it is highly valued by turners[7]. The wood is heavier than water and does not float[7]. It is used for tools, machine parts, etc[7, 11, 13, 61].

dwatta Astringent Cholera Febrifuge Nutritive The bark and the fruit are astringent, febrifuge and nutritive[7]. The astringent fruit is a good treatment for bowel complaints and fevers, whilst it is also used in the treatment of cholera[4, 254]. The flowers are used in the treatment of diarrhoea[4]. nrakta Europe. Naturalized in Britain[17]. ksacta Woodlands, especially in calcareous soils[7, 13].

propta Seed - best sown as soon as it is ripe in a cold frame or in an outdoors seedbed if there is sufficient seed[80, 113]. The seed must be separated from the fruit flesh since this contains germination inhibitors[80, 164]. Stored seed should be cold stratified for 3 - 4 months and sown as early as possible in the year[164]. Scarification may also help as may a period of warm stratification before the cold stratification[80, 164]. Germination, especially of stored seed, can be very slow, taking 18 months or more[164]. Prick out the seedlings of cold-frame sown seeds into individual pots as soon as they are large enough to handle and grow the plants on for their first winter in a greenhouse, planting out in the spring after the last expected frosts. Cuttings of half-ripe side shoots, July/August in a frame[188]. Cuttings of mature wood of the current year's growth, taken with a heel if possible, autumn in a cold frame. High percentage[78]. Layering of new growth in June/July. Takes 9 months[78].

nwatta Landscape Uses:Border, Firewood, Pest tolerant, Hedge, Screen, Specimen, Woodland garden. An easily grown plant, it succeeds in any soil of good or moderate fertility[1], ranging from acid to shallow chalk[200]. Grows well in heavy clay soils. Prefers a moist soil[108] and a sunny position[15] but also succeeds in light shade[188]. Plants are fairly wind resistant[K]. Plants grow and crop well in pots. A very hardy plant, tolerating temperatures down to about -25°C[184]. At one time the cornelian cherry was frequently cultivated for its edible fruit, though it has fallen into virtual disuse as a fruit crop in most areas[3]. It is still being cultivated in parts of C. Europe and there are some named varieties[183]. 'Macrocarpa' has larger fruits than the type[182]. 'Nana' is a dwarf form, derived from a yellow-fruited clone[182]. 'Variegata' has been seen on a number of occasions with very large crops of fruit, even in years when the type species has not fruited well[K]. 'Jolico' has well-flavoured fruits 3 times larger than the species. There are also a number of cultivars with yellow, white and purplish fruit. Seedlings can take up to 20 years to come into fruit. Plants produced from cuttings come into fruit when much younger, though they do not live as long as the seedlings. A very ornamental plant[1] it flowers quite early in the year and is a valuable early food for bees[13, 108]. Plants in this genus are notably resistant to honey fungus[200]. Special Features: Attracts birds, Not North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

5.2.61 *Sanguisorba minor*

Salad Burnet, Small burnet
4 tlin 8 cyuc 4 kcaak 3 tcan 2 dwat m hkc
htut cyutli tcup hwicli hyishrasjnutnyik hpa 7tli flatprikliwsslip
hpa 7tmwatli fyifxre 7t hjonli
drutta *Sanguisorba minor* is an evergreen Perennial growing to 0.6 m (2ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It

is in leaf all year, in flower from May to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate maritime exposure.

kcakta Edible Parts: Leaves Edible Uses: Tea Young leaves and shoots - raw or cooked[2, 5, 9, 14, 21]. They are best used before the plant comes into flower[9]. Eaten in salads, used as a garnish or added to soups, cooling drinks and claret cups[183]. Young seedlings are boiled and eaten[183]. A bit fiddly to harvest and the leaves sometimes become bitter in hot dry summers, but they are usually fairly mild tasting in the winter and some people detect a cucumber flavour to them[K]. In the acid soil of our Cornish trial grounds, the leaves have a distinctly bitter flavour, though when the same plants were grown on a chalky soil they had a much milder flavour[K]. The leaves contain about 5.65% protein, 1.2% fat, 11% carbohydrate, 1.7% ash, 74.5% water[179]. A herb tea is made from the dried leaves[21, 183].

tcanta Soil reclamation Soil stabilization Plants have extensive root systems and are used for erosion control, they are also used to reclaim landfills and mined-out terrain[160]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Astringent Diaphoretic Eczema Skin Styptic Both the root and the leaves are astringent, diaphoretic and styptic, though the root is most active[4]. The plant is an effective wound herb, quickly staunching any bleeding[244]. An infusion is used in the treatment of gout and rheumatism[244]. The leaves can be used fresh, or are harvested in July and dried (the plant should be prevented from flowering)[4]. The root is harvested in the autumn and dried[4]. An infusion of the leaves is used as a soothing treatment for sunburn or skin troubles such as eczema[201].

nrakta Europe, including Britain, from Sweden south and east to France, Armenia and Iran. ksacta Grassland, usually on calcareous soils[9, 17, 37].

propta Seed - sow March/April or September/October in a cold frame. Germinates in 3 weeks. Prick out the seedlings when they are large enough to handle into individual pots. Plant them out in the spring or early summer. The seed can also be sown in situ in spring or autumn if you have sufficient seed. Division in spring.

nwatta Prefers a light dry calcareous soil[1, 37, 200] but succeeds in most good soils[1, 37]. Plants also succeed in poor soils[4]. One report says that it grows well in marshy soil[24] but this is possibly a mistake[K]. Dislikes shade[14]. Occasionally cultivated in the herb garden, this is an evergreen herbaceous plant and it supplies fresh edible leaves all the year round, even in quite severe winters[K]. When grown as a salad, the plant should be prevented from flowering[4]. Grows well in the spring meadow[24]. Makes a good edging plant in the border[200]. Plants often self-sow, sometimes to the point of nuisance[K]. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

5.2.62 *Hemerocallis minor*

Grassleaf Day Lily, Small daylily
4 tlin 8 cyuc 4 kcaak 2 tcan 1 dwat m hkc

rip-ripen from July to August. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

drutta *Hemerocallis minor* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Leaves and young shoots - cooked[2, 20, 46, 61, 183]. They must be consumed when very young or else they become fibrous[K]. One report says that eating these leaves appears to stimulate or intoxicate to some extent[2]. Flowers and flower buds - raw or cooked[2, 20, 46, 61]. Considered to be a great delicacy[177]. The flowers are a traditional food in China where they are steamed and then dried[266]. The flowers can be dried and used as a relish or a thickener in soups etc[178, 183]. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked[183, 205]. A radish-like flavour but not so sharp[205].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205].

dwatta *Anodyne* Antidote Cancer Diuretic Febrifuge Vitamin C Anodyne, antidote, diuretic, febrifuge[178]. The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. The root also has a folk history of use in the treatment of cancer - extracts from the roots have shown antitumour activity[218]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - N. China, Korea. *ksacta* Water meadows, elevated wet places with sandy soils, forest glades, mountain slopes and scrub[74].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. A very cold-hardy plant, tolerating temperatures down to about -25°C[187]. Hybridizes freely with other members of this genus[200]. A very ornamental plant, its roots are slender and not tuberous, whilst the rhizomes are not spreading[187]. The roots sometimes have bulbous swellings at their tips[205]. The flowers open in the evening and live for about 2 days[205]. The flowers have a powerful scent of honeysuckle[245]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

5.2.63 *Morus alba multicaulis*

White Mulberry

4 tlin 8 cyuc 4 kcaok 0 tcan 3 dwat m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis hpa7tmwatli fyif hjonli

drutta *Morus alba multicaulis* is a deciduous Tree growing to 18 m (59ft 1in). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in May, and the seeds

rip-ripen from July to August. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Inner bark Leaves Edible Uses: Fruit - raw[2, 7, 158]. Sweet but usually insipid[3, 11]. It contains about 1.5% protein, 0.4% fat, 7.8% carbohydrate, 0.7% malic acid[179]. A richer flavour develops if the fruit is dried, it can then be used as a raisin substitute. The fruit is up to 25mm long[200]. Some caution is advised, see the notes above on toxicity. Young leaves and shoots - cooked[105, 183]. A famine food, it is only used when all else fails[177]. A good vegetable, it is rich in carotene and calcium[179]. The leaf also contains 10% tannin[179]. Inner bark - roasted and ground into a meal then used as a thickener in soups etc or mixed with cereals when making bread. A famine food when all else fails[179]. The tree is said to be a source of an edible manna[183]. Young shoots can be used as a tea substitute[183].

tcanta Dye Fibre Wood A fibre is obtained from the bark of one-year old stems, it is used in weaving[7, 74]. A brown dye is obtained from the trunk[178]. The leaves contain 10% tannin[179]. Wood - hard, durable, fine and close-grained. Used for boat building, furniture etc[145, 149, 158].

dwatta *Analgesic* Antiasthmatic Antirheumatic Antitussive Astringent Diaphoretic Diuretic Emollient Expectorant Hypoglycaemic Hypotensive Odontalgic Sedative Urinary- The white mulberry has a long history of medicinal use in Chinese medicine, almost all parts of the plant are used in one way or another[238]. Recent research has shown improvements in elephantiasis when treated with leaf extract injections and in tetanus following oral doses of the sap mixed with sugar[238]. Analgesic, emollient, sedative[7, 176]. The leaves are antibacterial, astringent, diaphoretic, hypoglycaemic, odontalgic and ophthalmic[218, 238]. They are taken internally in the treatment of colds, influenza, eye infections and nosebleeds[238]. The leaves are collected after the first frosts of autumn and can be used fresh but are generally dried[238]. The stems are antirheumatic, diuretic, hypotensive and pectoral[218, 238]. A tincture of the bark is used to relieve toothache[7]. The branches are harvested in late spring or early summer and are dried for later use[238]. The fruit has a tonic effect on kidney energy[218, 238]. It is used in the treatment of urinary incontinence, tinnitus, premature greying of the hair and constipation in the elderly[238]. The root bark is antitussive, diuretic, expectorant and hypotensive[238]. It is used internally in the treatment of asthma, coughs, bronchitis, oedema, hypertension and diabetes[238]. The roots are harvested in the winter and dried for later use[238]. Extracts of the plant have antibacterial and fungicidal activity[218].

nrakta E. Asia - central and northern China. *ksacta* Not known in a truly wild situation.

propta The seed germinates best if given 2 - 3 months cold stratification[80, 98]. Sow the seed as soon as it is ripe if possible, otherwise in February in a cold frame. The seed usually germinates in the first spring, though it sometimes takes another 12 months. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the cold frame for their first winter. Plant them out in late spring or early summer after the last expected frosts. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Plant out in spring. A good percentage take, though they sometimes fail to thrive[78, 113]. Cuttings of mature wood of the current season's growth, 25 - 30cm with a heel of 2 year old wood, autumn or early spring in a cold frame or a shady bed outside[78, 113, 200]. Bury the cuttings to threequarters of their depth. Layering in autumn[200].

nwatta Prefers a warm well-drained loamy soil in a sunny position[1, 11]. This variety of *M. alba* is said to have superior fruits[105]. According to many botanists it is no more than a clone of the species[200]. This is the form most commonly cultivated in India, where it is fast growing and adapted to field culture. It gives a high yield of large, tender, thick leaves[269]. Mulberries have brittle roots and so need to be handled with care when planting them out[238]. Any pruning should only be carried out in the winter when the plant is fully dormant because mulberries bleed badly when cut[238]. Ideally prune only badly placed branches and dead

wood[238]. A good tree for growing grapes into[20]. The grapes are difficult to pick but always seem to be healthier and free from fungal diseases[201]. Plants in this genus are notably resistant to honey fungus[200].

5.2.64 *Amelanchier canadensis*

Juneberry, Canadian serviceberry, Serviceberry Downy, Shadblow, Shadbush, Serviceberry
4 tlin 7 cyuc 4 kcak 4 tcan 1 dwat 6 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik
hpa7tmwatli fyifxre7t hjonli

drutta *Amelanchier canadensis* is a deciduous Shrub growing to 6 m (19ft) by 3 m (9ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in April, and the seeds ripen in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

ckaaka Edible Parts: Fruit Edible Uses: Edible fruit - raw or cooked[3, 55, 101, 159]. The fruit contains a few small seeds at the centre, it has a sweet flavour with a hint of apple[1, 2]. It can be eaten out of hand, used in pies, preserves etc or dried and used like raisins[183]. We have found the fruit to be of variable quality, with some forms having a distinct bitterness in the flavour whilst others are sweet, juicy and delicious[K]. When the fruit is thoroughly cooked in puddings or pies the seed imparts an almond flavour to the food[183]. The fruit is rich in iron and copper[226]. It is about 10mm in diameter[200]. Trees can yield 7 to 15 tonnes per hectare[160].

tcanta Disinfectant Hedge Hedge Rootstock Shelterbelt Wood This species can be used as a dwarfing rootstock for *Malus* spp. (the apples) and *Pyrus* spp. (the pears)[160]. Plants can be grown as an informal hedge[200]. Any trimming is best done after flowering[200]. A fairly wind-tolerant species, it can be used to give protection from the wind as part of a mixed shelterbelt[200]. Wood - hard, strong, close grained. Used for tool handles, small implements etc[46, 61].

dwatta Anthelmintic Disinfectant Women's complaints A tea made from the root bark (mixed with other unspecified herbs) was used as a tonic in the treatment of excessive menstrual bleeding and also to treat diarrhoea[222, 257]. A bath of the bark tea was used on children with worms[222, 257]. An infusion of the root was used to prevent miscarriage after an injury[257]. A compound concoction of the inner bark was used as a disinfectant wash[257].

nrakta Eastern N. America - Nova Scotia to Ontario, south to Florida. Naturalized in Britain[17]. ksacta Swamps, low ground, woods and thickets[43]. Grows in woods and hedgerows in Britain[17].

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nwatta Landscape Uses: Specimen, Woodland garden. Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not water-logged, too dry or poor[11], though it is more wet-tolerant than other members of this genus[11]. Grows well in heavy clay soils. Prefers an acid soil[17, 43]. Trees produce more and better quality

fruits better when growing in a sunny position[1]. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible ornamentals. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. There is at least one named variety of this species with superior fruits. 'Prince William' is a large multi-stemmed shrub to 3 metres tall and 2 metres across[183, 200]. It crops heavily and its good quality fruit is about 12mm in diameter[183]. Considerable confusion has existed between this species and *A. arborea*, *A. laevis* and *A. lamarckii*, see [11] for the most recent (1991) classification. Hybridizes freely with other members of this genus[200]. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1]. Special Features: Attracts birds, North American native, Attracts butterflies, Blooms are very showy. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2].

5.2.65 *Actinidia polygama*

Silver Vine

4 tlin 8 cyuc 4 kcak 0 tcan 2 dwat 6 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli nyanhjen hjonli

drutta *Actinidia polygama* is a deciduous Climber growing to 6 m (19ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to July, and the seeds ripen from October to November. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required) and is pollinated by Bees, insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ckaaka Edible Parts: Fruit Leaves Edible Uses: Tea Fruit - raw or cooked[183]. Not very palatable, it is eaten salted[151, 177]. Some cultivars have nice flavoured fruits[183]. The fruit contains up to 5 times the vitamin C of blackcurrants[74]. Fairly large fruits, up to 3cm across[200]. The ovoid fruits are orange and hairless when fully ripe[266]. It contains a number of small seeds, but these are easily eaten with the fruit[K]. Leaves - raw or cooked[4, 61, 105, 177, 183]. The leaves can also be roasted and mixed with tea[183].

dwatta Hallucinogenic Sedative Vitamin C The leaves are hallucinogenic and sedative[192]. The leaves contain substances that make them very attractive to cats and for this reason they are especially useful as a sedative for lions etc in zoos[192]. When consumed in large quantities the leaves can have a mild hallucinatory effect[192]. Polygamol, which is made from the fruits, is used as a heart tonic[218]. A dry decoction is used to treat colic and rheumatism[218].

nrakta E. Asia - China, Japan ksacta Woodlands and hedges in mountains throughout Japan[58]. Mountain forests at elevations of 500 - 1900 metres in China[266].

propta Seed - sow spring in a greenhouse[133]. It is probably best if the seed is given 3 months stratification[113], either sow it in a cold frame as soon as it is ripe in November or as soon as it is received. Fresh seed germinates in 2 - 3 months at 10°C, stored seed can take longer[133]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. When the

are astringent, demulcent, diuretic, expectorant, febrifuge, laxative, parasiticide and mildly sedative[21, 218]. They are used internally in the treatment of gastritis, whooping cough, coughs and bronchitis[238]. They also help to relieve vomiting and morning sickness during pregnancy, though the dose must be carefully monitored because of their diuretic action[21]. The dried and powdered leaves have sometimes been used to help heal sores and wounds[21]. The leaves are harvested in June and July then dried for later use[4]. The flowers are diuretic, sedative and vermifuge[4, 21, 176, 194, 218]. They are used internally in the treatment of constipation and oedema[238]. A gum from the stems is alterative, astringent, demulcent and sedative[4, 21, 176, 194, 218]. The seed is antispasmodic, antitussive, emollient, haemolytic, laxative and sedative[4, 21, 176, 194, 218]. It is used internally in the treatment of constipation in the elderly, cough, asthma and menstrual disorders[238]. The bark is demulcent, diuretic, expectorant and sedative[4]. It is used internally in the treatment of gastritis, whooping cough, coughs and bronchitis[238]. The root bark is used in the treatment of dropsy and jaundice[218]. The bark is harvested from young trees in the spring and is dried for later use[4]. The seed contains 'laetrile', a substance that has also been called vitamin B17[218]. This has been claimed to have a positive effect in the treatment of cancer, but there does not at present seem to be much evidence to support this[K]. The pure substance is almost harmless, but on hydrolysis it yields hydrocyanic acid, a very rapidly acting poison - it should thus be treated with caution[218]. In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

Prunus persica nucipersica is a deciduous tree growing to 6 m (19ft) by 6 m (19ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in April, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

5.2.66 Prunus persica nucipersica

Nectarine

4 tlin 8 cyuc 4 kcaak 2 tcan 3 dwat 6 m hkuc
htut cythl tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli fyfxre7t hjonli

drutta Prunus persica nucipersica is a deciduous tree growing to 6 m (19ft) by 6 m (19ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in April, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista The seed can contain high levels of hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is readily detected by its bitter taste. Usually present in too small a quantity to do any harm, any very bitter seed or fruit should not be eaten[65]. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Flowers Fruit Oil Oil Seed Edible Uses: Gum Oil Oil Tea Fruit - raw, cooked or dried for later use[1, 2, 34, 46]. The fruit is often used in ice creams, pies, jams etc[183]. When fully ripe, the fruits of the best forms are soft and juicy with a rich delicious flavour[K]. The size of fruit varies between cultivars but can be up to 7cm in diameter and contains one large seed[200]. Flowers - raw or cooked. Added to salads or used as a garnish[183]. They can also be brewed into a tea[183]. The distilled flowers yield a white liquid which can be used to impart a flavour resembling the seed[183]. Seed - raw or cooked. Do not eat if it is too bitter, seed can contain high concentrations of hydrocyanic acid. See the notes above on toxicity. A semi-drying oil is obtained from the seed[57]. Although the report does not mention edibility it can be assumed that it is edible. A gum is obtained from the stem. It can be used for chewing[64].

tcanta Adhesive Cleanser Dye Gum Gum Oil Oil A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. A semi-drying oil is obtained from the seed[57]. It is used as a substitute for almond oil in skin creams[238]. The bruised leaves, when rubbed within any container, will remove strong odours such as garlic or cloves so long as any grease has first been fully cleaned off[4]. A gum obtained from the stem is used as an adhesive[64]. Espalier.

dwatta Alterative Antispasmodic Antitussive Astringent Demulcent Diuretic Emollient Expectorant Febrifuge Haemolytic Laxative Sedative Antihistosis[194]. The leaves

are astringent, demulcent, diuretic, expectorant, febrifuge, laxative, parasiticide and mildly sedative[21, 218]. They are used internally in the treatment of gastritis, whooping cough, coughs and bronchitis[238]. They also help to relieve vomiting and morning sickness during pregnancy, though the dose must be carefully monitored because of their diuretic action[21]. The dried and powdered leaves have sometimes been used to help heal sores and wounds[21]. The leaves are harvested in June and July then dried for later use[4]. The flowers are diuretic, sedative and vermifuge[4, 21, 176, 194, 218]. They are used internally in the treatment of constipation and oedema[238]. A gum from the stems is alterative, astringent, demulcent and sedative[4, 21, 176, 194, 218]. The seed is antispasmodic, antitussive, emollient, haemolytic, laxative and sedative[4, 21, 176, 194, 218]. It is used internally in the treatment of constipation in the elderly, cough, asthma and menstrual disorders[238]. The bark is demulcent, diuretic, expectorant and sedative[4]. It is used internally in the treatment of gastritis, whooping cough, coughs and bronchitis[238]. The root bark is used in the treatment of dropsy and jaundice[218]. The bark is harvested from young trees in the spring and is dried for later use[4]. The seed contains 'laetrile', a substance that has also been called vitamin B17[218]. This has been claimed to have a positive effect in the treatment of cancer, but there does not at present seem to be much evidence to support this[K]. The pure substance is almost harmless, but on hydrolysis it yields hydrocyanic acid, a very rapidly acting poison - it should thus be treated with caution[218]. In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta E. Asia - China. ksacta Not known in a truly wild situation, it is possibly derived in cultivation from P. davidiana.

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. The stored seed is best given 2 months warm followed by 3 months cold stratification[113]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. A very low percentage[113]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Requires a well-drained moisture retentive soil[1, 11]. Thrives in a loamy soil, doing well on limestone[11]. Best not grown in acid soils. Prefers some chalk in the soil but it is apt to become chlorotic if too much is present[1]. Prefers a pH in the range 6 to 7[200]. Succeeds in light shade but fruits better in a sunny position[11]. Requires shelter from north and north-east winds[11] and also from spring frosts[200]. Widely cultivated for its edible fruit in warm temperate areas and continental climates, this is a form of the peach with a smooth skin. There are some named varieties[183]. There are numerous divisions of the varieties according to skin colour etc. Perhaps the most useful from the eaters point of view is whether it is free-stone (the flesh parts easily from the seed) or cling-stone (the flesh adheres to the seed)[200, K]. Trees are normally hardy in southern Britain[11], tolerating temperatures down to about -20°C[184], but they require some protection if cropping is to be at all reliable[11]. This is not due so much to lack of cold hardness, more to the cooler summers in Britain which do not fully ripen the wood and the fruit, plus the unpredictable winters and springs which, in a mild spell, can excite the tree into premature flowering and growth which is then very liable to damage in any following cold spell. Hand pollination at this time can improve fruit-set[200]. In general it is best to site nectarines in a very warm sheltered sunny position, preferably against a south or west facing wall[200, 219], though some success is occasionally seen with plants grown fully in the open[K]. Most cultivars are self-fertile[200]. Trees are often grafted onto plum or other rootstocks but are said to be better when grown on their own roots in southern Britain[11]. Trees are not generally long-lived[200], this is partly because of the need for the tree to produce a constant supply of new wood since most fruit is formed on one-year old wood (though some fruit spurs are

[200]. Garlic is a good companion for this plant, helping to prevent disease, especially peach leaf curl[20, 201]. Tansy grown below peach trees helps to keep them healthier[201]. Peach leaf curl can also be prevented by protecting the plants from winter and early spring rains, perhaps by covering them in plastic[200]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. Espalier: tree or other plant that is trained to grow flat against a support (such as a trellis or wall).

5.2.67 *Crataegus succulenta*

Fleshy hawthorn

4 tlin 8 cyuc 4 kcaok 2 tcan 2 dwat 6 m hkuc
hmimhtut cyutli hgatkuyctuphja7n hwicli hrasjlutnyikfrip
hpa7tli flatpriklwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus succulenta* is a deciduous Shrub growing to 6 m (19ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[62, 101, 105]. Excellent for making jellies[183], it can also be dried for later use. A small fruit with a sweet, juicy and pulpy flesh[82, 183], it is up to 17mm in diameter[235]. Another report says that the fruit is large for a *Crataegus* species, it is about 35mm in diameter and is borne in small clusters[200]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern N. America - Nova Scotia to North Carolina, west to Montana, Colorado and Utah. ksacta Thickets, pastures and woodland edges, especially in dry or rocky soils[43].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but

undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. This species is closely related to *C. tomentosa*[11].

5.2.68 *Pyrus bretschneideri*

4 tlin 8 cyuc 4 kcaok 0 tcan 0 dwat 6 m hkuc
hmimhtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flat-
priklwiss hpa7tmwatli xre7t hjonli

drutta *Pyrus bretschneideri* is a deciduous Tree growing to 6 m (19ft 8in). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in May, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[177, 200]. The fruit is up to 3cm in diameter[200].

nrakta E. Asia - N. China. ksacta Slopes, dry cold regions at elevations of 100 - 2000 metres[266].

propta Seed - best sown in a cold frame as soon as it is ripe in the autumn, it will then usually germinate in mid to late winter. Stored seed requires 8 - 10 weeks cold stratification at 1°C and should be sown as early in the year as possible[200]. Temperatures over 15 - 20°C induce a secondary dormancy in the seed[200]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in a cold frame or greenhouse for their first year. Plant them out in late spring or early summer of the following year.

nwatta Prefers a good well-drained loam in full sun[200]. Grows well in heavy clay soils. Tolerates light shade but does not fruit so well in such a position. Tolerates atmospheric pollution, excessive moisture and a range of soil types if they are moderately fertile[200]. Established plants are drought tolerant[200]. Plants are hardy to at least -15°C[200]. This species is closely related to *P. ussuriensis ovoidea*[200]. This species is commonly cultivated in northern China, preferring sunny, dry, loamy soils. It includes many important forms with excellent fruit[266]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

5.2.69 *Hemerocallis multiflora*

4 tlin 8 cyuc 4 kcaok 0 tcan 1 dwat m hkuc
hmimhtut cyutli kyuctup hwicli hrasjlutnyikfrip hpa7tli flat-
priklwiss hpa7tmwatli xre7t hjonli

drutta *Hemerocallis multiflora* is a PERENNIAL growing to 1 m (3ft 3in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from July to September. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral

and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcanta Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Leaves and young shoots - cooked[205]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked. Relatively small for a day lily, but the flowers are crisp with a pleasant sweetness and no aftertaste - they make a delicious addition to salads[K]. The flowers can also be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked[K]. We have found them to be tender but fairly bland with a slight sweetness[K]. The roots are slightly fleshy, with a swollen, tuberous part near the tip[266]. The swollen roots are quite small and are only really worthwhile using if the plant is being dug up for divisions or some other reason[K].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China in Hunan, Japan. ksacta Hill forests and openings in forests on hilltops at elevations of 700 - 1000 metres China[266].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[11] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. This species is closely related to *H. micrantha* and *H. plicata*[205]. Individual flowers are short-lived but the plant produces a succession of blooms. Each scape carries between 75 and 100 blooms[205]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

5.2.70 *Crataegus mollis*

Red Haw, Downy hawthorn

4 tlin 8 cyuc 4 kcak 2 tcan 2 dwat m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrp hpa7tli
flatprkwiwslip hpa7tmwatli xre7t hjonli

drutta *Crataegus mollis* is a deciduous Tree growing to 9 m (29ft) by 12 m (39ft) at a medium rate. See above for USDA hardness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Tea Fruit - raw or cooked[22, 46, 62, 101, 183]. Sub-acid, dry and mealy[82, 227]. The fruit is also used for making jellies and preserves[61, 95, 183]. Fairly large, it is about 20 - 25mm in diameter[200], with a thick flesh[229]. There are up to five

fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K]. A tea-like beverage can be made from the twigs[257].

tcanta Hedge Hedge The plant is tolerant of being trimmed and will even resprout if cut back into very old wood. It can be used as a hedge[50]. Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern and Central N. America - Ontario to Alabama, west to Oklahoma. ksacta Open woods, usually in alluvial or fertile soils[43]. Frequently found in limestone soils[229].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Sowing the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta Landscape Uses: Espalier, Pollard, Specimen, Street tree. A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. A very hardy plant, tolerating temperatures down to at least -18°C[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A very ornamental plant[11], the branches are almost thornless[229]. A rather variable species, it has been separated into several different species by some botanists[82]. This species is much confused with *C. chrysoarpa*[11] and with *C. coccinea*[50]. It is very closely related to *C. submollis*, differing in having 20 stamens to a flower (as compared to 10 in *C. submollis*)[202]. Special Features: North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 6 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or

more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.2.71 *Rhus typhina*

Stag's Horn Sumach, Velvet Sumach, Staghorn Sumac

4 tlin 8 cyuc 4 kcaak 3 tcan 2 dwat 6 m hkuc
htut cyuti hgatkuyctup hwieli hyihrasahjlutnyik hpa7tli flat-
prikkwis hpa7tmwatl nyanhjen hjonli

drutta *Rhus typhina* is a deciduous Shrub growing to 6 m (19ft) by 6 m (19ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to August, and the seeds ripen from October to December. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Bees. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista There are some suggestions that the sap of this species can cause a skin rash in susceptible people, but this has not been substantiated. See also notes in 'Cultivation Details'.

kcakta Edible Parts: Fruit Oil Edible Uses: Drink Oil-Fruit - cooked[22, 62]. A very sour flavour, they are used in pies[183]. The fruit is rather small and with very little flesh, but it is produced in quite large clusters and so is easily harvested. When soaked for 10 - 30 minutes in hot or cold water it makes a very refreshing lemonade-like drink (without any fizz of course)[55, 85, 95, 101, 102, 183]. The mixture should not be boiled since this will release tannic acids and make the drink astringent.

tcanta Dye Hedge Hedge Ink Mordant Musical Oil Pipes Shelterbelt Soil stabilization Tannin Wood The leaves are rich in tannin, up to 48% has been obtained in a controlled plantation[223]. They can be collected as they fall in the autumn and used as a brown dye or as a mordant[169, 171]. The bark, especially the root bark, and the fruits are also very rich in tannin[82, 159, 169]. A yellow dye can be obtained from the roots[257]. An orange dye can be obtained from the inner bark and central pith of the stem, mixed with bloodroot (*Sanguinaria canadensis*)[257]. A black ink can be made by boiling the leaves and the fruit[226]. An oil is extracted from the seeds[4]. It attains a tallow-like consistency on standing and is used to make candles. These burn brilliantly, though they emit a pungent smoke[4]. Pipes are made from the young shoots and are used for drawing the sap of sugar maples (*Acer* spp)[82]. They are also used as flutes[159]. The plant has an extensive root system and is planted as a windbreak screen and to prevent soil erosion[200]. Wood - soft, light, brittle, coarse grained[82, 101]. It weighs 27lb per cubic foot[235]. Of no commercial value, though it is sometimes used as a rough construction wood or is employed in turning[226].

dwatta Antihæmorrhoidal Antiseptic Astringent Blood purifier Diuretic Emetic Galactagogue Poultice Stomachic Tonic VD Warts Stag's horn sumach was often employed medicinally by several native North American Indian tribes who valued it especially for its astringent qualities[257]. It is little used in modern herbalism. Some caution is advised in the use of the leaves and stems of this plant, see the notes above on toxicity. The bark is antiseptic, astringent, galactagogue and tonic[222, 257]. An infusion is used in the treatment of diarrhoea, fevers, piles, general debility, uterine prolapse etc[213, 222]. An infusion is also said to greatly increase the milk flow of a nursing mother - small pieces of the wood were also eaten for this purpose[257]. The inner bark is said to be a valuable remedy for piles[257]. The roots are astringent, blood purifier, diuretic and emetic[222]. An infusion of the roots, combined with purple coneflower (*Echinacea purpurea*) has been used in the treatment of venereal

disease[257]. A poultice of the roots has been used to treat boils[257]. The leaves are astringent. They have been used in the treatment of asthma, diarrhoea and stomatitis[222]. An infusion of the fruits has been used as a tonic to improve the appetite and as a treatment for diarrhoea[257]. The berries are astringent and blood purifier[257]. They were chewed as a remedy for bed-wetting[222, 257]. A tea made from the berries has been used to treat sore throats[213]. The flowers are astringent and stomachic. An infusion has been used to treat stomach pains[257]. The sap has been applied externally as a treatment of warts[226]. Some caution is advised here since the sap can cause a rash on many people[K].

nrakta Eastern N. America - New Brunswick to the southern Appalachian mountains and west to Iowa. ksacta Usually found in upland sites on rich soils, but it is also found in gravel and sandy nutrient-poor soils. It grows by streams and swamps, along roadsides, railway embankments and edges of woods[229].

propta Seed - best sown in a cold frame as soon as it is ripe. Pre-soak the seed for 24 hours in hot water (starting at a temperature of 80 - 90c and allowing it to cool) prior to sowing in order to leach out any germination inhibitors[200]. This soak water can be drunk and has a delicious lemon-flavour. The stored seed also needs hot water treatment and can be sown in early spring in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 10cm with a heel, July/August in a frame[200]. Root cuttings 4cm long taken in December and potted up vertically in a greenhouse. Good percentage[78, 200]. Suckers in late autumn to winter[200].

nwatta Landscape Uses: Border, Massing, Specimen. Succeeds in a well-drained fertile soil in full sun[11, 200]. Tolerates poor soils[169, 200]. Succeeds in dry soils and is drought resistant once it is established[169]. A fairly wind-hardy plant, though the branches are brittle and can be broken off in very high winds[200, K]. A very hardy plant, when fully dormant it can tolerate temperatures down to at least -25°C[200]. However, the young growth in spring can be damaged by late frosts. A fast growing but short-lived tree[159], it can sucker freely, forming thickets and becoming quite anti-social when grown in small areas[11]. Single-stem plants are short-lived in cultivation, but if the plants are coppiced regularly and allowed to form thickets, then they will live longer and also be more ornamental with larger leaves[238]. Any coppicing is best carried out in early spring[238]. A very ornamental plant, there are some named varieties[182]. It is susceptible to coral spot fungus[11] but is notably resistant to honey fungus[88, 200]. It transplants easily[169]. This is a very good bee plant, the flowers producing an abundance of pollen and nectar[226]. There is some doubt over the validity of this name and the earlier *R. hirta*. [L.] has been proposed as the correct name. However, it seems likely that *R. typhina* will be retained because it is so well known[214]. This species is closely related to and hybridizes with *R. glabra*[101]. Many of the species in this genus are highly toxic and can also cause severe irritation to the skin of some people, whilst other species such as this one are not poisonous. It is relatively simple to distinguish which is which, the poisonous species have axillary panicles and smooth fruits whilst non-poisonous species have compound terminal panicles and fruits covered with acid crimson hairs[1, 4]. The toxic species are sometimes separated into their own genus, *Toxicodendron*, by some botanists[200]. Dioecious. Male and female plants must be grown if seed is required. Special Features: Attracts birds, North American native, Attractive flowers or blooms. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

5.2.72 Crataegus durobrivensis

Caughuawaga Hawthorn

4 tin 8 cyuc 4 kcaek 2 tcan 2 dwat 5 m hkuc

hmimhtut cyutli hgattcupha7n hwicli hrasjlutnyikfrp hpa7tli

flatpriklwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus durobrivensis* is a deciduous Shrub growing to 5 m (16ft) by 5 m (16ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked. A reasonable size, it is up to 15mm in diameter[200], and is very acceptable for raw eating[K]. It is sweet and fairly juicy when fully ripe with a hint of apple in its flavour[K]. The fruit can be used in making pies, preserves, etc. and can also be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta North-eastern N. America. ksacta Not known in a truly wild situation, it is possibly a hybrid *C. pruinosa* x *C. suborbiculata*[43].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. A very hardy plant, tolerating temperatures down to about -18°C[202]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not

be left in a seedbed for more than 2 years without being transplanted[11]. Probably a natural hybrid, *C. pruinosa* x *C. suborbiculata*[43].

5.2.73 Castanea pumila

Chinquapin. Ozark chinkapin

4 tin 8 cyuc 4 kcaek 2 tcan 1 dwat 4 m hkuc

htut cyutli hgatyucctup hwicli hyhshrasjlutnyik hpa7tli frus-

flatprikl hpa7tmwatli hjonli

drutta *Castanea pumila* is a deciduous Shrub growing to 4 m (13ft 1in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in July, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

kcakta Edible Parts: Seed Edible Uses: Seed - raw or cooked[2, 61, 105]. Sweet with a nice nutty flavour[46, 82, 183], it is very acceptable raw and has a superior flavour to sweet chestnuts (*C. sativa*)[142, 161, K]. When baked it becomes even sweeter and develops a floury texture, it makes an excellent potato or cereal substitute[K]. The seed is quite small, about 2cm thick[270], which is about half the size of *C. dentata*[183]. It is sold in local markets in America[82]. The seed husks only contain one (rarely two) seed[235]. The seed contains 45% starch and 2.5% protein[213].

tcanta Tannin Wood The bark, leaves, wood and seed husks all contain tannin. Wood - coarse-grained, hard, strong, light, durable, easy to split. It weighs 37lb per cubic foot. Too small for commercial use, but it is occasionally used for fence posts, fuel etc[46, 61, 227, 229].

dwatta Antiperiodic Astringent Tonic The leaves contain tannin and are antiperiodic, astringent and tonic[46, 61, 213]. An infusion of the leaves has been used as an external wash for the feverish condition common to colds[213, 257].

nrakta Eastern N. America - New Jersey and Pennsylvania to Florida, Missouri and Texas. ksacta Dry sandy ridges and rich hillsides where it forms thickets, also in woods and on the borders of swamps[43, 82].

propta Seed - where possible sow the seed as soon as it is ripe in a cold frame or in a seed bed outdoors[78]. The seed must be protected from mice and squirrels. The seed has a short viability and must not be allowed to become dry. It can be stored in a cool place, such as the salad compartment of a fridge, for a few months if it is kept moist, but check regularly for signs of germination. The seed should germinate in late winter or early spring. If sown in an outdoor seedbed, the plants can be left in situ for 1 - 2 years before planting them out in their permanent positions. If grown in pots, the plants can be put out into their permanent positions in the summer or autumn, making sure to give them some protection from the cold in their first winter[K]. Division of suckers in winter[200]. They can be planted straight out into their permanent positions.

nwatta Prefers a good well-drained slightly acid loam but succeeds in dry soils[1, 11, 200]. Once established, it is very drought tolerant[1, 11, 200]. Very tolerant of highly acid, infertile dry sands[200]. Averse to calcareous soils but succeeds on harder limestones[11, 200]. This species is an excellent soil-enriching understorey in pine forests[200], growing and fruiting well so long as the canopy of pines is fairly light. Although it is very winter-hardy, this species only really thrives in areas with hot summers[200]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. Plants can spread widely by means of underground suckers[11]. Flowers are produced on wood of the current year's growth[229]. Plants are fairly self-sterile[200]. They hybridize freely with other members of this genus[200]. Fruits are produced in 2 - 3 years from seed[117]. One report says that plants never fruit in Britain[11], but a 2 metre tall plant at Wisley fruits most years[K]. Trees on our Cornish trial grounds produced a few female flowers when 1 metre tall and 4 years old[K]. This species is occasionally cultivated for its edible seed in N. America, there are some named varieties[183]. The plants

seedlings abundantly in the wild[183]. The sub-species *C. pumila ashei*. Sudw. (Zone 7) is a coastal form, found from Virginia to Texas[200]. Plants in this genus are notably resistant to honey fungus[200]. The plant is heat tolerant in zones 9 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

5.2.74 *Chaenomeles cathayensis*

Chinese Quince

4 tin 8 cyuc 4 kcaok 0 tcan 2 dwat 3 m hkuc hmimhtut cyutli tcup hwicli hrasjlutnyikfrrip hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta *Chaenomeles cathayensis* is a deciduous Shrub growing to 3 m (9ft) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in April, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - very harsh raw but fragrant when cooked[1, 3, 4, 11, 177]. It makes an excellent jelly[183] and a very good jam, it is especially good cooked with apples in apple pies[K]. The fruit is very large and can be 15cm long and 9cm wide[200].

dwatta Antiemetic Antirheumatic Antispasmodic DigestiveThe fruit is antiemetic, antirheumatic, antispasmodic and digestive[176]. It is used in the treatment of rheumatic pain, convulsions of the calf muscles, vomiting, dyspepsia and diarrhoea[176].

nrakta E. Asia - China. ksacta Scrub and hedges in W. Hubei[184]. Slopes, forest margins and roadsides at elevations of 900 - 2500 metres[266].

propta Seed - best sown as soon as it is ripe in a sheltered position outdoors or in a cold frame[200]. Sow stored seed in February in a greenhouse[78]. Germination usually takes place within 6 weeks[78]. Prick out the seedlings into individual pots as soon as they are large enough to handle. If well grown, these seedling can be large enough to plant out in the summer, but give them some protection in their first winter. Otherwise plant them out in late spring of the following year[K]. Cuttings of half-ripe wood, July/August in a frame[11]. Cuttings of mature wood of the current year's growth, November in a cold frame. Layering in late spring or in autumn. This is a sure and easy method, though it takes 12 months[78, 200].

nwatta Easily cultivated in any reasonably good soil[1, 200]. Prefers a deep moist well-drained loam[4, 11]. Grows well in heavy clay soils. Tolerates full shade but requires a sunny position for best fruit production[3, 11, 200]. Becomes chlorotic on very alkaline soils[188, 200]. Tolerates atmospheric pollution[200]. A very ornamental plant[1], it is hardy to about -25°C[200]. Plants are subject to canker, especially when growing in the milder moister areas of Britain[49]. Plants in this genus are notably resistant to honey fungus[200]. Fruits are usually freely produced in Britain, but they do not always ripen[11, 182]. The plant grows and fruits well on a south wall at Kew[K]. A good bee plant, flowering early in the year and providing pollen and

nectar[108]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

5.2.75 *Amelanchier basalticola*

Dwarf Service-berry

4 tin 8 cyuc 4 kcaok 0 tcan 0 dwat 3 m hkuc hmimhtut cyutli tcup hwicli hrasjlutnyikfrrip hpa7tli flatprik-lwis hpa7tmwatli fyfjxre7t hjonli

drutta *Amelanchier basalticola* is a deciduous Shrub growing to 3 m (9ft) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in April, and the seeds ripen from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: We have no records for this species, but the fruit is almost certainly edible both raw or cooked[K]. It is 9 - 12mm in diameter[200]. The fruit is rich in iron and copper[226].

nrakta North-western N. America - Washington. ksacta Open woods, canyons and hillsides, from near sea level to the sub-alpine zone[60].

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nwatta Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not too dry or water-logged[11]. Grows well in heavy clay soils. Prefers an acid or neutral soil. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible ornamentals. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. There is much difference of opinion in the naming of members of this genus, with many botanists viewing this species as no more than a form of *A. alnifolia*[60]. It hybridizes freely with other members of the genus[200]. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1].

5.2.76 *Sambucus caerulea*

Blue Elder

4 tin 8 cyuc 4 kcaok 3 tcan 2 dwat 3 m hkuc hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfrrip hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta *Sambucus caerulea* is a deciduous Shrub growing to 3 m (9ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from June to July, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay

soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

pcista The leaves, green fruits and stems of some (if not all) members of this genus are poisonous[9, 76, 226]. The fruit of this species has been known to cause stomach upsets to some people. Any toxin the fruit might contain is liable to be of very low toxicity and is destroyed when the fruit is cooked[65, 76].

kcakta Edible Parts: Flowers Fruit Edible Uses: Tea Fruit - raw, cooked or used in preserves[2, 3, 15, 85, 94, 183, 257]. Rather sweet and juicy but full of small seeds[82, 256], this is the best flavoured of the North American elders[212]. The fruit is rather nice raw, seven people ate and enjoyed a small quantity of the raw fruit with no ill effects[K]. The fruit can be dried for later use[257]. A somewhat rank taste fresh[101], the fruit is usually dried before being used[183]. The fruit is about 6mm in diameter and is borne in large clusters[200]. Some caution is advised, see the notes above on toxicity. Flowers - raw or cooked in fritters etc[15, 85, 94, 183]. Very pleasant and refreshing raw[K]. A pleasant tea is made from the dried flowers[62, 183].

tcanta Musical Repellent Tinder Wood A decoction of the leaves, when watered on plants, repels caterpillars[94]. The dried flower stems repel insects and rodents[101]. The hollow stems can be used as flutes and pipes[257]. The pith of the stems has been used as a tinder for lighting fires[257]. Wood - light, soft, weak, coarse grained. Of no commercial value, though it is used locally for flutes, skewers, pegs, straws etc[82, 94, 99, 229].

dwatta Analgesic Antiseptic Astringent Diaphoretic Emetic Febrifuge Haemostatic Laxative Pectoral Salve Stomachic Tonic Haemostatic[94]. An infusion or extract made from the flowers, bark and root has been used to cure fevers and gripe, it is also laxative[226]. A decoction of the plant has been used as an antiseptic wash to treat itches[257]. The bark is analgesic and astringent[257]. An infusion has been used in the treatment of diarrhoea and rheumatism[257]. A decoction has been used as a wash in the treatment of swellings and pain[257]. An ointment made by mixing the bark with fat has been used externally in the treatment of burns, ulcers, skin irritations etc[226]. The fresh bark has been placed in a tooth cavity to ease the pain of toothache[257]. The inner bark is strongly emetic[257]. The leaves are analgesic, antiseptic, diaphoretic, febrifuge and purgative[257]. A decoction has been used in the treatment of new colds[257]. An infusion of the leaves and flowers has been used as a steam bath in the treatment of colds and headaches[257]. A decoction of the leaves has been used as an antiseptic wash on limbs affected by blood poisoning[257]. The crushed leaves have been used as a poultice to treat burns and swollen hands[257]. A decoction of the root has been used in the treatment of bladder problems and dyspepsia[257]. A decoction of the flowers has been used in the treatment of stomach troubles and lung complaints[257]. Applied externally, it has been used to treat sprains and bruises and as an antiseptic wash for open sores and itches[257]. A wine made from the fruit has been used as a tonic[257].

nrakta Western N. America - British Columbia to California, east to Montana, Texas and Mexico. ksacta Gravelly, rather dry soils on stream banks, margins of fields, woodlands etc[62, 82].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame, when it should germinate in early spring. Stored seed can be sown in the spring in a cold frame but will probably germinate better if it is given 2 months warm followed by 2 months cold stratification first[78, 98, 113]. Prick out the seedlings into individual pots when they are large enough to handle. If good growth is made, the young plants can be placed in their permanent positions during the early summer. Otherwise, either put them in a sheltered nursery bed, or keep them in their pots in a sheltered position and plant them out in spring of the following year. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame[78]. Cuttings of mature wood of the current season's growth 15 - 20cm with a heel, late autumn in a frame or a sheltered outdoor bed[78].

nwatta Tolerates most soils, including chalk[200], but prefers a moist loamy soil[11, 200]. Grows well in heavy clay soils. Tolerates some shade but is best in a sunny position[1].

Tolerates atmospheric pollution and coastal situations[200]. A fast-growing but short-lived tree in the wild[229]. A shrub at Kew in September 1993 was carrying a good crop of tasty fruits[K]. Plants in this genus are notably resistant to honey fungus[200].

5.2.77 Helianthus hybrids

Perennial Sunflower

4 tlin 11 cyuc 4 kcaak 2 tcan 2 dwat 3.6 m hkuc
htut cyutli kyucctup hwicli hyishrasjlutnyik hpa7tli flatprikklwis hpa7tmwatli hjonli

drutta Helianthus hybrids is a PERENNIAL growing to 3.6 m (11ft) by 0.6 m (2ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 10. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Flowers Oil Seed Stem Edible Uses: Drink Oil Carbon Farming Solutions - Staple Crop: protein-oil (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1]. Perennial crops are being developed for their oil-seed. The Land Institute see them as part of a perennial polyculture system [1-1].

tcanta Biomass Oil See individual species. Some sunflowers are a good source of biomass. The tubers are used in industry to make alcohol etc[141]. The alcohol fermented from the tubers is said to be of better quality than that from sugar beets[269]. Can be grown as a temporary summer screen[200]. Ornamental. A food plants for the larvae of many lepidopterans.

dwatta Various medicinal qualities depending on the species.

nrakta Origin: hybrid. All Helianthus species are native to North America except for three species in South America. ksacta Cold to semi-arid regions.

propta See individual species.

nwatta Management: Standard Staple Crop: Protein-oil Under Development Climate: boreal to warm temperate. Humidity: semi-arid to humid. Carbon Farming Solutions - Cultivation: under development. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1]. Perennial crops are being developed for their oil-seed. The Land Institute see them as part of a perennial polyculture system [1-1]. Several perennial sunflowers are being worked with including prairie natives handling boreal to warm temperate semi-arid conditions: Helianthus maximiliani (Maximilian sunflower), Helianthus tuberosus (Jerusalem artichoke), Helianthus pauciflorus (Stiff sunflower). Less tolerant of boreal conditions but good on poor soils is Helianthus cusickii (Cusick's sunflower) [1-1].

5.2.78 Helianthus tuberosus

Jerusalem Artichoke

4 tlin 8 cyuc 4 kcaak 3 tcan 1 dwat 2.4 m hkuc
htut cyutli kyucctup hwicli hyishrasjlutnyik hpa7tli flatprikklwis hpa7tmwatli xre7t hjonli

drutta Helianthus tuberosus is a PERENNIAL growing to 2.4 m (7ft) by 0.6 m (2ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in October, and the seeds ripen in November. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Root Edible Uses: Coffee Sweetener Tubers - raw or cooked[2, 46, 61, 95]. The tuber develops a pleasant sweetness during the winter, especially if subjected to frosts, and is then reasonably acceptable raw[K]. Otherwise it is generally best cooked, and can be used in all the ways that potatoes are used[K]. The tubers are rich in inulin[46], a starch which the body cannot digest, so Jerusalem

artichokes provide a bulk of food without many calories[K]. Some people are not very tolerant of inulin, it tends to ferment in their guts and can cause quite severe wind[K]. The tubers are fairly large, up to 10cm long and 6cm in diameter[200]. The tubers bruise easily and lose moisture rapidly so are best left in the ground and harvested as required[200]. The inulin from the roots can be converted into fructose, a sweet substance that is safe for diabetics to use[46, 171]. The roasted tubers are a coffee substitute[183].

caanta BiomassThe plants are a good source of biomass. The tubers are used in industry to make alcohol etc[141]. The alcohol fermented from the tubers is said to be of better quality than that from sugar beets[269]. A fast-growing plant, Jerusalem artichokes can be grown as a temporary summer screen[200]. Very temporary, it is July before they reach a reasonable height and by October they are dying down[K].

dwatta Aperient Cholagogue Diuretic Stomachic TonicReported to be aperient, aphrodisiac, cholagogue, diuretic, spermatogenetic, stomachic, and tonic, Jerusalem artichoke is a folk remedy for diabetes and rheumatism[269].

nrakta Eastern N. America - Nova Scotia to Minnesota and Kansas. Occasionally naturalized in Britain. ksacta Rich and damp thickets[43].

propta Seed - sow spring in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Division in spring or autumn[200]. Harvest the tubers in late autumn or the winter and either re-plant the tubers immediately or store them in a cool but frost-free place and plant them out in early spring. Jerusalem artichoke is propagated by tubers, which should be planted as early as possible in the spring when the soil can be satisfactorily worked[269]. Late planting usually reduces tuber yields and size seriously. Whole tubers or pieces about 50 g (2 oz.) should be planted like potatoes and covered to a depth of 10 cm. Pieces larger than 50 g do not increase the yield, though those smaller will decrease it. Deeper planting may delay emergence, weaken the sprouts, and cause the tubers to develop deeper, making harvest more difficult[269]. Basal cuttings in spring. Harvest the shoots when they are about 10 - 15cm long with plenty of underground stem. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer.

nwatta Management: Standard Staple Crop: Protein-oiila v very easily grown plant, it grows best in a loose circumneutral loam but succeeds in most soils and conditions in a sunny position[1, 16, 37, 38, 269]. Plants are more productive when grown in a rich soil[1, 37, 38]. Heavy soils produce the highest yields, but the tubers are easily damaged at harvest-time so lighter well-drained sandy loams are more suitable[200]. Dislikes shade[1]. Likes some lime in the soil[16]. Jerusalem artichoke is reported to tolerate an annual precipitation of 31 to 282cm, an average annual temperature of 6.3 to 26.6°C and a pH in the range of 4.5 to 8.2[269]. Jerusalem artichokes were cultivated as a food plant by the N. American Indians and they are today often grown in temperate areas for their edible tubers. There are some named varieties[4, 46, 183, 200]. The plant is a suitable crop in any soil and climate where corn (*Zea mays*) will grow. It survives in poor soil and in areas as cold as Alaska. It also tolerates hot to sub-zero temperatures[269]. The first frost kills the stems and leaves, but the tubers can withstand freezing for months[269]. The plants are particularly suited to dry regions and poor soils where they will out-yield potatoes[200]. Tuber production occurs in response to decreasing day-length in late summer[200]. Yields range from 1 - 2kg per square metre[200]. The tubers are very cold-tolerant and can be safely left in the ground in the winter to be harvested as required. They can be attacked by slugs, however, and in sites prone to slug damage it is probably best to harvest the tubers in late autumn and store them over the winter. It is almost impossible to find all the tubers at harvest time, any left in the soil will grow away vigorously in the spring. Plants do not flower in northern Europe. They are sensitive to day-length hours, requiring longer periods of light from seedling to maturation of plant, and shorter periods for tuber formation. They do not grow where day-lengths vary little[269]. The plant is good weed eradicator, it makes so dense a shade that few other plants can compete[269]. The young growth is extremely attractive to slugs, plants can be totally destroyed

by them[K]. Members of this genus are rarely if ever troubled by browsing deer or rabbits[233]. Plants only produce flowers in Britain after a long hot summer[17] and seed is rarely formed[200]. Grows well with corn[20]. Plants can be invasive[1]. The plant is heat tolerant in zones 9 through 7. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

5.2.79 *Lonicera angustifolia*

Narrow-leaved honeysuckle

4 tlin 8 cyuc 4 kcak 2 tcan 0 dwat 2.7 m hkuc
htut cyutli tcup hwicli hrasjltutnyik hpa7tli flatprikwliw
hpa7tmwatli fyifxre7t hjonli

drutta *Lonicera angustifolia* is a deciduous Shrub growing to 2.7 m (8ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from April to May, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw[11, 51, 158, 200, 272]. Sweet and pleasant tasting, the fruit is a bit smaller than a blackcurrant[K]. Plants often produce a second crop in late summer[K].

caanta WoodWood - hard, very close grained. Used for walking sticks[158, 272].

nrakta E. Asia - Himalayas. ksacta Forests and shrubberies, under oak, fir and deodar, to elevations of 3600 metres[51, 146].

propta Seed - best sown as soon as it is ripe in a cold frame. Stored seed requires 2 months cold stratification[113] and should be sown as soon as possible in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 7-10cm with or without a heel, July/August in a frame. Good percentage[78]. Cuttings of mature wood of the current season's growth, 15-20cm with or without a heel, November in a cold frame. Good percentage[78]. Layering in autumn[200].

nwatta An easily grown plant, it grows best in a good moist soil in a sunny position, it does not fruit so well in the shade[200]. Plants are fairly wind tolerant[K]. Plants flower and fruit better in hotter climates than Britain[182]. Plants have been seen bearing good crops of fruit in eastern Britain, though we have only managed to produce light crops on our Cornish trial grounds[K]. The flowers have a soft 'honeysuckle' perfume[245]. This species is closely related to *L. myrtillos*[11].

5.2.80 *Berberis buxifolia*

Magellan Barberrry

4 tlin 8 cyuc 4 kcak 3 tcan 2 dwat 2.5 m hkuc
hmimhtut cyutli kyuctup hwicli hyishrasjltutnyikfrp hpa7tli
flatprikwliw hpa7tmwatli fyifxre7t hjonli

drutta *Berberis buxifolia* is an evergreen Shrub growing to 2.5 m (8ft) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf all year, in flower in April. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects.

Plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Fruit **Edible Uses:** Fruit - raw or used in preserves[3, 11, 69, 139, 177]. Freely borne in Britain. Large and black with a pleasant flavour, they are eaten out of hand[183]. Said to be the best flavoured of the South American barberries, the fruit is hardly acid and but slightly astringent[2]. The green unripe fruits can be used like gooseberries in pies etc[2, 183]. The fruits are about 8mm long[200].

tcanta Dye Hedge Hedge A yellow dye is obtained from the root[139]. The dwarf form, var. 'Nana' makes a good dwarf hedge to 1 metre tall[182].

dwatta Antibacterial Cancer Dysentery Berberine, universally present in rhizomes of Berberis species, has marked antibacterial effects. Since it is not appreciably absorbed by the body, it is used orally in the treatment of various enteric infections, especially bacterial dysentery[218]. It should not be used with Glycyrrhiza species (Liquorice) because this nullifies the effects of the berberine[218]. Berberine has also shown antitumour activity[218].

nrakta S. America - S. Chile and S. Argentina. Occasionally naturalized in Britain[17]. **ksacta Coastal scrub, forest margins, clearings and moister areas in grass**[69].

propta Seed - best sown as soon as it is ripe in a cold frame, when it should germinate in late winter or early spring[78]. Seed from over-ripe fruit will take longer to germinate[78], whilst stored seed may require cold stratification and should be sown in a cold frame as early in the year as possible[80]. The seedlings are subject to damping off, so should be kept well ventilated[113]. When the seedlings are large enough to handle, prick them out into individual pots and grow them on in a cold frame. If growth is sufficient, it can be possible to plant them out into their permanent positions in the autumn, but generally it is best to leave them in the cold frame for the winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood, July/August in a frame. Roots in 4 - 8 weeks[113]. Pot up in spring[113]. Cuttings of mature wood of the current season's growth, preferably with a heel, October/November in a frame[78].

nwatta Prefers a warm moist loamy soil and light shade but it is by no means fastidious, succeeding in thin, dry and shallow soils and in full sun[11, 200]. Grows well in heavy clay soils. Plants are hardy to about -15°C[184], but they can be deciduous in cold winters[188]. The dwarf *B. buxifolia nana* is the form of this species that is most commonly found growing in Britain. It is very free flowering but to date (1994) we have not seen this form bearing fruit[K]. The species is supposed to be self-fertile so it is possible that this form is sterile. Hybridizes freely with other members of this genus[1]. Plants can be pruned back quite severely and re-sprout well from the base[200].

5.2.81 *Smilax herbacea*

Carriion Flower, Smooth carriionflower
4 tlin 8 cyuc 4 kcak 2 tcan 1 dwat 2.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis hpa7tmwatli nyanhjen hjonli

drutta *Smilax herbacea* is a PERENNIAL CLIMBER growing to 2.5 m (8ft 2in). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from May to June. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit **Leaves** **Root** **Edible Uses:** Gelatine **Leaves** and young shoots - raw or cooked and used like asparagus[85, 102, 159]. A delicate and palatable vegetable[183]. Fruit - raw or cooked and used in jellies etc[85, 183]. It should only be used when fully ripe[183]. A pleasant flavour[207, 257]. The fruit is about 10mm in diameter[200]. **Root - cooked**[257]. It can be dried, ground into a powder

and then used with cereals for making bread etc[62, 102]. It can also be used as a gelatine substitute[62, 102].

dwatta Analgesic Antiaphonic Kidney Pectoral Poultice **Salve** Eating the fruit is said to be effective in treating hoarseness[207, 257]. The parched and powdered leaves have been used as a dressing on burns[257]. The wilted leaves have been used as a dressing on boils[257]. The root is analgesic[257]. A decoction has been used in the treatment of back pains, stomach complaints, lung disorders and kidney problems[257].

nrakta Eastern N. America - southwards from Quebec. **ksacta Open woodlands, meadows and rich alluvial thickets**[43]. Higher elevations in rich woods, alluvial thickets, and meadows, often in calcareous soils at elevations of 100-800 metres[270].

propta Seed - sow March in a warm greenhouse[1]. This note probably refers to the tropical members of the genus, seeds of plants from cooler areas seem to require a period of cold stratification, some species taking 2 or more years to germinate[K]. We sow the seed of temperate species in a cold frame as soon as we receive it, and would sow the seed as soon as it is ripe if we could obtain it then[K]. When the seedlings eventually germinate, prick them out into individual pots when they are large enough to handle and grow them on in the greenhouse for at least their first year, though we normally grow them on in pots for 2 years. Plant them out into their permanent positions in early summer. Division in early spring as new growth begins[238]. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer. Cuttings of half-ripe shoots, July in a frame[238].

nwatta Succeeds in most soils in sun or semi-shade[200]. Hardy to about -20°C[200]. A polymorphic species, varying in both leaf shape and growth habit[43, 270]. The flowers are malodorous[200], they smell like dead rats[207]. A vigorous plant, it can be grown through trees or shrubs or over tree stumps[200]. The sub-species *S. herbacea nipponicum* is used in Japan[61]. This report probably refers to the species *S. nipponica*[K]. Dioecious. Male and female plants must be grown if seed is required. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Growth habit is a single or multiple shooting vine from a crown [1-2]. **Herbaceous.**

5.2.82 *Ribes divaricatum*

Coastal Black Gooseberry, Spreading gooseberry, Parish's gooseberry, Straggly gooseberry
4 tlin 8 cyuc 4 kcak 2 tcan 1 dwat 2.7 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Ribes divaricatum* is a deciduous Shrub growing to 2.7 m (8ft 10in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in April, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit **Leaves** **Edible Uses:** Fruit - raw or cooked[2, 3, 61, 118, 257]. Sweet and juicy[183]. A very acceptable flavour, though a bit on the acid side[K]. It is considered to be one of the finest wild N. American gooseberries[183]. The fruit is sometimes harvested before it is fully ripe and then cooked[256]. The fruit is about 10mm in diameter[200]. On the wild species the fruit can hang on the plant until the autumn (if the birds leave it alone)[K]. Young leaves and unripe fruits are used to make a sauce[183].

tcanta **Miscellany Needles String** The roots have been boiled with cedar (*Juniperus* spp, *Thuja* sp.) and wild rose (*Rosa* spp) roots, then pounded and woven into rope[257]. The sharp thorns have been used as probes for boils, for removing splinters and for tattooing[257].

dwatta **Miscellany TB VD** The inner bark has been chewed, and the juice swallowed, as a treatment for colds

Use sored throats[257]. A decoction of the bark of the root has been used as an eye wash for sore eyes[257]. An infusion of the roots has been used in the treatment of sore throats, venereal disease and tuberculosis[257]. The burnt stems have been rubbed on neck sores[257].

nrakta Western N. America. ksacta Open woods, prairies and moist hillsides[60].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 4 - 5 months cold stratification at between 0 to 9°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. Requires a very sunny position if it is to do well[11]. Plants are hardy to about -20°C[200]. This species is closely allied to *R. rotundifolium*[11]. Immune to mildew[101], this species is a parent of many mildew resistant hybrids and is being used in breeding programmes in Europe[200]. Plants can harbour a stage of white pine blister rust, so should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200]. Sometimes cultivated for its edible fruit, there is at least one named variety[183]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out. The root pattern is suckering with new plants from underground runners away from the plant [2-1].

5.2.83 *Ribes odoratum*

Buffalo Currant

4 tlin 8 cyuc 4 kcak 0 tcan 1 dwat 2.5 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
lwis hpa7tmwatli xre7t hjonli

drutta *Ribes odoratum* is a deciduous Shrub growing to 2.5 m (8ft) by 2.5 m (8ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in April, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Fruit Edible Uses: Condiment Tea Fruit - raw or cooked[2, 62, 85, 257]. The quality varies from plant to plant, the best forms are sweet and make very pleasant eating[K]. The fruit ripens from late July and can hang on the bush until early autumn[K]. The fruit can also be dried for winter use[183]. The fruit is about 10mm in diameter, though it is larger in some selected cultivars[200]. Flowers - raw. A sweet taste[85]. The leaves can be used to make a tea or as a flavouring in foods[183].

dwatta Antidotea poultice of the plant has been applied to snakebites[257].

nrakta Central N. America - Saskatchewan and Minnesota, west to the Rockies and south to Texas. ksacta Rocky bluffs and slopes, also along the sides of streams[235].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 3 months cold stratification at between 0 and 5°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold

frame or sheltered bed outdoors[78, 200]. Division of suckers in the dormant season. They can be planted out directly into their permanent positions.

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. Prefers full sun but it is quite tolerant of shade though it does not fruit so well in such a position[11]. Hardy to about -25°C[184]. A very ornamental plant[1]. The flowers are deliciously clove-scented[245]. This species is closely allied to *R. aureum*[11, 200]. Occasionally cultivated for its edible fruit, there are some named varieties[183]. The period of fruit ripening is unusually long[183]. The cultivar 'Crandall' has large edible fruits with a tart-sweet flavour that are high in pectin[200]. This species succeeds in regions having hot summers[183]. The fruits can be red, black, yellow, golden or reddish-brown[164]. Plants often produce suckers, especially when growing in damp soils. Plants can harbour a stage of white pine blister rust, so should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

5.2.84 *Rhus copallina*

Dwarf Sumach, Winged sumac, Flameleaf Sumac, Winged Sumac, Shining Sumac

4 tlin 10 cyuc 4 kcak 3 tcan 2 dwat 2 m hkuc
htut cyutli hgtakyuctcup hwicli hyishrasjlutnyik hpa7tli flat-
prikllwis hpa7tmwatli nyanhjen hjonli

drutta *Rhus copallina* is a deciduous Shrub growing to 2 m (6ft) by 2 m (6ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to September, and the seeds ripen from October to December. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Bees. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista There are some suggestions that the sap of this species can cause a skin rash in susceptible people, but this has not been substantiated. See also notes in 'Cultivation Details'.

kcakta Edible Parts: Fruit Oil Edible Uses: Drink Oil Fruit - raw or cooked[22, 46, 161]. An agreeable acid flavour[2]. The fruit is only 3 - 5mm long with very little flesh, but it is borne on dense panicles and is thus easily harvested[229]. When soaked for 10 - 30 minutes in hot or cold water it makes a very refreshing lemonade-like drink (without any fizz of course)[95, 105, 149, 159, 183]. The mixture should not be boiled since this will release tannic acids and make the drink astringent.

tcanta Dye Hedge Hedge Mordant Oil Resin Soil stabilization Tannin Varnish Wood The leaves are rich in tannin[46, 82, 169], so is the bark[149] and the fruit[169]. The leaves can be collected as they fall in the autumn and used as a brown dye or as a mordant[169, 171]. The leaves contain 10 - 25% tannin[171]. Up to 35.8% has been obtained from some plants[223]. An oil is extracted from the seeds[4]. It

use a tall-like consistency on standing and is used to make candles. These burn brilliantly, though they emit a pungent smoke[4]. The plants extensive root system makes it useful for stabilizing soils. A black dye is obtained from the fruit[149, 257]. A resin, 'copal resin', is obtained from the sap of this plant. When dissolved in any volatile liquid, such as oil of turpentine, it makes a beautiful varnish[4]. (Is this a mistaken entry? Perhaps it belongs with one of the toxic species[K]). Wood - light, soft, coarse grained[82]. It weighs 32lb per cubic foot[227]. Sometimes used for small posts[149].

dwatta Astringent Dysentery Enuresis Galactogogue Poultice SalveA decoction of the root has been used in the treatment of dysentery[222]. An infusion of the roots has been used in the treatment of VD[257]. A poultice of the root has been applied to sores and skin eruptions[257]. A tea made from the bark has been drunk to stimulate milk flow in nursing mothers. A decoction of the bark has been used as a wash for blisters and sunburn blisters[222, 257]. An infusion of the leaves has been used to cleanse and purify skin eruptions[257]. The berries were chewed in the treatment of bed-wetting and mouth sores[222, 257]. Some caution is advised in the use of the leaves and stems of this plant, see the notes above on toxicity.

nrakta Eastern N. America - Maine to Florida, west to Texas and Illinois. ksacta Generally found in dry soils on hillsides, along the margins of woodlands and roads, and in abandoned fields[229].

propta Seed - best sown in a cold frame as soon as it is ripe. Pre-soak the seed for 24 hours in hot water (starting at a temperature of 80 - 90c and allowing it to cool) prior to sowing in order to leach out any germination inhibitors[200]. This soak water can be drunk and has a delicious lemon-flavour. The stored seed also needs hot water treatment and can be sown in early spring in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 10cm with a heel, July/August in a frame[200]. Root cuttings 4cm long taken in December and potted up vertically in a greenhouse. Good percentage[78, 200]. Suckers in late autumn to winter[200].

nwatta Experimental Crop Industrial Crop: Dye Industrial Crop: Hydrocarbon Industrial Crop: Tannin Management: CoppiceLandscape Uses:Border, Erosion control, Pest tolerant, Massing, Specimen. Succeeds in a well-drained fertile soil in full sun[11, 200]. Tolerates poor soils[169, 200]. Established plants are drought resistant[169]. A very hardy species, when fully dormant it can tolerate temperatures down to about -25°C[200]. However, the young growth in spring can be damaged by late frosts. A very ornamental plant[1]. It is quite fast-growing but short-lived in the wild[229]. In the north of its range plants are dwarf, around 1.2 metres tall, but in the south they can be up to 7 metres tall[182]. Some botanists divide this species into separate species, whilst others see it as a single species with geographical forms. R. copallina is usually a shrub and is found in moist soils in sun or shade[227]. R. copallina lanceolata. Gray. is more tree-like and is found in drier soils[227]. Transplants easily[169]. Plants have brittle branches and these can be broken off in strong winds[200]. Plants are also susceptible to coral spot fungus[11]. Many of the species in this genus are highly toxic and can also cause severe irritation to the skin of some people, whilst other species such as this one are not poisonous. It is relatively simple to distinguish which is which, the poisonous species have axillary panicles and smooth fruits whilst non-poisonous species have compound terminal panicles and fruits covered with acid crimson hairs[1, 4]. The toxic species are sometimes separated into their own genus, Toxicodendron, by some botanists[200]. Plants in this genus are notably resistant to honey fungus[200]. Dioecious. Male and female plants must be grown if seed is required. Special Features:Attracts birds, North American native, Attracts butterflies, Attractive flowers or blooms. Carbon Farming - Cultivation: experimental. Management: coppice. The plant is heat tolerant in zones 9 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over

86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

5.2.85 *Amaranthus caudatus*

Love Lies Bleeding

4 tin 8 cyuc 4 kcaak 2 tcan 1 dwat 2 m hkuc htut cryutli hgatkyuctup hwicli hyhshrasjlutnyik hpa7tli frus-flatpryklwissliphsom hpa7tmwatli fyif hjonli

drutta *Amaranthus caudatus* is a ANNUAL growing to 2 m (6ft) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to September, and the seeds ripen from August to September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid, very alkaline and saline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista No members of this genus are known to be poisonous, but when grown on nitrogen-rich soils they are known to concentrate nitrates in the leaves. This is especially noticeable on land where chemical fertilizers are used. Nitrates are implicated in stomach cancers, blue babies and some other health problems. It is inadvisable, therefore, to eat this plant if it is grown inorganically.

kaakta Edible Parts: Leaves SeedEdible Uses: ColouringLeaves - raw or cooked as a spinach or added to soups etc[22, 46, 61, 105, 183]. The mild flavoured leaves are rich in vitamins and minerals[183, K]. Seed - cooked[22, 46, 57, 105]. Very small but easy to harvest and very nutritious, individual plants can bear up to 100, 000 seeds[196]. It is eaten cooked or ground into a powder and used in baking[61, 183, 196]. The seed can also be popped in much the same way as popcorn[97, 183]. The seed can be cooked whole, and becomes very gelatinous like this, but it is rather difficult to crush all of the small seeds in the mouth and thus some of the seed will pass right through the digestive system without being assimilated[K]. The seed is very nutritious and contains 13 - 18% of a very high quality protein that is rich in the amino acid lysine[196]. It also contains good quantities of calcium, phosphorus, iron, potassium, zinc, vitamin E and the vitamin B complex[196]. A red food colouring called 'betalaina' is obtained from red cultivars[196].

tcanta DyeYellow and green dyes can be obtained from the whole plant[168].

dwatta Anthelmintic AstringentThe plant is astringent, anthelmintic and diuretic[4, 240]. It is used in the treatment of stranguary and is applied externally to scrofulous sores[240].

nrakta Tropics. ksacta A weed of cultivated ground[145].

propta Seed - sow late spring in situ. An earlier sowing can be made in a greenhouse and the plants put out after the last expected frosts. Germination is usually rapid and good if the soil is warm[133]. A drop in temperature overnight aids germination[133]. Cuttings of growing plants root easily[206].

nwatta Prefers a well-drained fertile soil in a sunny position[196, 200]. Grows moderately well in poor soils[200]. Requires a hot sheltered position if it is to do well[K]. Plants are drought resistant though reasonable moisture levels are required for germination and also at pollination[196]. Some forms can tolerate a pH up to 8.5, there are also some that can tolerate mild salinity[196]. It is likely that they will also tolerate acid soils and aluminium toxicity[196]. Plants are not frost-hardy, the most cold tolerant cultivars can tolerate

temperatures down to about 4°C[196]. Plants should not be given inorganic fertilizers, see notes above on toxicity. This species is cultivated for its edible seed and leaves in the Andes and various other parts of S. America[46, 61, 97]. It probably arose through cultivation from *A. quitensis*. There are some named varieties[196]. Plants take 4 - 6 months from sowing to harvesting the seed, but up to 10 months in some Andean highland regions[196]. Yields from 1 - 3 tonnes per hectare are common, 5 tonnes has been achieved and research sites have produced the equivalent of 6 tonnes per hectare[196]. The seed is usually harvested just before maturity otherwise some of the seed will be lost during harvesting[196]. Plants usually have downward facing seedheads but varieties have been developed with upward facing heads that can be harvested mechanically[196]. This species is sensitive to day-length most cultivars are short-day and have not done well in northern latitudes, but there are some varieties that flower at day-lengths up to 16 hours[196]. Most if not all members of this genus photosynthesize by a more efficient method than most plants. Called the 'C4 carbon-fixation pathway', this process is particularly efficient at high temperatures, in bright sunlight and under dry conditions[196]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is clumping, giving the plant a clumping habit. The predictable growth behaviour makes it easier to maintain without having to apply containment methods[2-1].

5.2.86 *Rhus trilobata*

Skunk Bush, Basketbush, Squawbush, Three Leaf Sumac
 4 tlin 6 cyuc 4 kcaak 3 tcan 2 dwat 1.8 m hkuc
 htut cyutli kyuctup hwicli hrasjlutnyik hpa7tli flatprikwlis
 hpa7tmwatli nyanhjen hjonli

drutta *Rhus trilobata* is a deciduous Shrub growing to 1.8 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in April. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Bees. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

pcista There are some suggestions that the sap of this species can cause a skin rash in susceptible people, but this has not been substantiated. See also notes in 'Cultivation Details'.

ckakta Edible Parts: Fruit Oil Edible Uses: Drink Oil-Fruit - raw or cooked[62, 85, 92, 94, 95, 149]. The fruit can be eaten fresh, dried, mixed with cornmeal or made into a jam[183]. The fruit is small with very little flesh, but it is produced in fairly large panicles and so is easily harvested. When soaked for 10 - 30 minutes in hot or cold water it makes a very refreshing lemonade-like drink (without any fizz of course)[85, 92, 149, 183]. The mixture should not be boiled since this will release tannic acids and make the drink astringent. The fruit is about 6mm in diameter[200].

tcanta Basketry Deodorant Deodorant Dye Mordant Oil Repellent Tannin The leaves are rich in tannin. They can be collected as they fall in the autumn and used as a black to brown dye or as a mordant[169, 257]. The fruits can also be used as a mordant[257]. A yellow dye is obtained from the twigs[149]. black dye can be obtained when the twigs are mixed with pine gum[257]. A red-brown dye can be made from the bark and leaves[257]. A pink-tan dye can be made from the fruit[257]. The ashes of the plant can be used as a mordant to fix dyes[257]. An oil is extracted from the seeds[4]. It attains a tallow-like consistency on standing and is used to make candles. These burn brilliantly, though they emit a pungent smoke[4]. The roots have been used as a perfume and deodorant[257]. The buds have been used on the body as a medicinal deodorant and perfume[257]. The leaves have been rubbed on the body as an insect and snake repellent[257]. Some caution should be employed here, see the notes above on toxicity[K]. The branches are tough and slender, they are stripped of their bark and split into several strands then used in basket making[46, 92, 94, 95, 149, 257].

dwatta Analgesic Antipruritic Astringent Contraceptive Deodorant Deodorant Diuretic Emetic Haemostatic Odontalgic Oxytoxic Stomachic Skunk bush was employed medicinally by several native North American Indian tribes, who valued it especially for its astringent qualities and used it to treat a range of complaints[257]. It is little, if at all, used in modern herbalism. Due to its potentially toxic nature, it should be used with some caution and preferably only under the supervision of a qualified practitioner. The fruit is analgesic, astringent and stomachic[257]. It has been eaten as a treatment for stomach problems and grippe[257]. The dried berries have been ground into a powder and dusted onto smallpox pustules[257]. The fruit has been chewed as a treatment for toothache and also used as a mouthwash[257]. A decoction of the fruit has been used as a wash to prevent the hair falling out[257]. The leaves are astringent, diuretic, emetic and haemostatic[257]. An infusion of the leaves has been used in the treatment of head colds[257]. A decoction of the leaves has been drunk to induce impotency as a method of contraception[257]. A poultice of leaves has been used to treat itches[257]. An infusion of the bark has been used as a douche after childbirth[257]. The bark has been chewed, and the juice swallowed, as a treatment for colds and sore gums[257]. A decoction of the root bark has been taken to facilitate easy delivery of the placenta[257]. The roots have been used as a deodorant[257]. The buds have been used on the body as a medicinal deodorant and perfume[257].

nrrakta Western N. America. ksacta Foothills, canyons, slopes etc, usually on dry rocky soils[62] and especially on limestone outcrops[149].

propta Seed - best sown in a cold frame as soon as it is ripe. Pre-soak the seed for 24 hours in hot water (starting at a temperature of 80 - 90c and allowing it to cool) prior to sowing in order to leach out any germination inhibitors[200]. This soak water can be drunk and has a delicious lemon-flavour. The stored seed also needs hot water treatment and can be sown in early spring in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 10cm with a heel, July/August in a frame[200]. Root cuttings 4cm long taken in December and potted up vertically in a greenhouse. Good percentage[78, 200]. Suckers in late autumn to winter[200].

nwatta Landscape Uses: Border, Hedge, Massing. Succeeds in a well-drained fertile soil in full sun[11, 200], but produces its best fruit when grown close to moist ground[85]. Judging by the plants native habitat it should succeed in dry soils[K]. The young growth in spring can be damaged by late frosts. This species is closely allied to *R. aromatica*[11]. Plants have brittle branches and these can be broken off in strong winds[200]. Plants are also susceptible to coral spot fungus[11]. Plants in this genus are notably resistant to honey fungus[200]. Many of the species in this genus are highly toxic and can also cause severe irritation to the skin of some people, whilst other species such as this one are not poisonous. It is relatively simple to distinguish which is which, the poisonous species have axillary panicles and smooth fruits whilst non-poisonous species have compound terminal panicles and fruits covered with acid crimson hairs[1, 4]. The toxic species are sometimes separated into their own genus, *Toxicodendron*, by some botanists[200]. Dioecious. Male and female plants must be grown if seed is required. Special Features: North American native.

5.2.87 *Streptopus amplexifolius*

Wild Cucumber, Claspleaf twistedstalk, Tubercle twistedstalk

4 tlin 8 cyuc 4 kcaak 1 tcan 2 dwat 1 m hkuc
 pcmhmim cyutli tcup hwicli hrasjlut hpa7tli flatprikwlis
 hpa7tmwatli xre7t hjonli

drutta *Streptopus amplexifolius* is a PERENNIAL growing to 1 m (3ft 3in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from May to July, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It

light grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

ksakta Edible Parts: Fruit Leaves Root**Edible Uses:** Fruit - raw or cooked in soups and stews[105, 161, 172]. Juicy with a cucumber flavour[183], they are reported to be slightly cathartic when growing in certain areas only[183]. The fruit is laxative if eaten in large quantities according to another report[172]. The oval berry is up to 15mm long[235]. Tender young shoots - raw in salads or cooked like asparagus[177, 183, 257]. A cucumber-like flavour[172, 183]. Root - raw. It is sometimes used in salads for its cucumber flavour[105, 177, 183].

tcanta IncenseThe plant has been tied to the clothes, body or hair and used as a scent[257].

dwatta Analgesic Appetizer Cathartic Haemostatic Kidney Oxxytic Stomachic VDThe fruit is cathartic[172, 207]. An infusion of the stems and fruit has been used to treat 'sickness in general'[257]. The plant is tonic[257]. An infusion of the whole plant has been used to treat stomach complaints and loss of appetite[257]. A compound infusion of the plant has been used in the treatment of spitting up of blood, kidney problems and gonorrhoea[257]. The root has been chewed in order to induce labour in cases of protracted delay[257]. A compound infusion of the root has been used as an analgesic in the treatment of internal pain[257].

nrakta Europe to E. Asia and N. America - Alaska to North Carolina, Ohio, Michigan and New Mexico. ksakta Wet sub-alpine woods[50, 187]. Moist woods and thickets[43, 50]. Rich moist coniferous and deciduous woods at elevations of 0 - 2800 metres in America[270].

propta Seed - best sown in a cold frame as soon as it is ripe in the summer[200]. Sow stored seed in a cold frame as soon as it is received. The seed, especially if it has been stored, can be very slow to germinate, sometimes taking 18 months or more. Prick out the seedlings into individual pots once they are large enough to handle and grow them on in a shady part of the greenhouse or cold frame. It will normally take 2 or more growing seasons before the roots are large enough to plant out - this is best done when the plant is dormant in the autumn. Division as the plant comes into growth in early spring. Larger divisions can be planted out direct into their permanent positions. We have found that it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame for their first year, planting them out in the following spring.

nwatta Requires a cool leafy soil in shade or partial shade[187]. Thrives in a moist light soil containing organic matter[1]. Hardy to at least -20°C. A polymorphic species, there are many sub-species[43]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

5.2.88 *Astrebla squarrosa*

Bull Mitchell grass

4 tlin 12 cyuc 4 kcak 1 tcan 0 dwat 1.5 m hkuc
htut cyutli hgatkyuctup hwicli hyishrasjlutnyikfrip hpa7tli flatprikhwis hpa7tmwatli hjonli

drutta *Astrebla squarrosa* is a PERENNIAL growing to 1.5 m (5ft) by 0.1 m (0ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 10. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

ksakta Edible Parts: Seed**Edible Uses:** Carbon Farming Solutions - Staple Crop: balanced carb (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1]. Cultivated in the past but largely or completely abandoned.

tcanta Providing habitat for organisms such as mammals.

nrakta Australasia. ksakta Heavy, cracking clays on plains and river flats, sometimes with *Lysiphllum* or *Excoecaria*, or in *Dicanthium-Eulalia* grassland and cleared Brigalow areas; flowers after rain.

propta Wild. Seed.

nwatta Historic Crop Management: Standard Staple Crop: Balanced carbClimate: subtropical to tropical. Humidity: semi-arid. Grow on clay soils, mainly between an upper limit of 600 mm average annual rainfall, and a lower limit of 200 mm, and even below in depressions where the water concentrates following rains e.g. in Sturt's Stony Desert. Mitchell grasses are deep rooted and become dormant during drought, allowing them to survive extended periods without rainfall. Carbon Farming Solutions - Cultivation: historic crop. Cultivated in the past but largely or completely abandoned. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

5.2.89 *Pastinaca sativa*

Parsnip, Wild parsnip

4 tlin 8 cyuc 4 kcak 2 tcan 1 dwat 1 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis hpa7tmwatli fyifxre7t hjonli

drutta *Pastinaca sativa* is a BIENNIAL growing to 1 m (3ft 3in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Skin contact with the sap can cause photosensitivity and/or dermatitis in some people[65, 76, 218]. Parsnip is said to contain the alleged 'psychotroph' myristicine[218].

ksakta Edible Parts: Leaves Root Seed**Edible Uses:** CondimentRoot - raw or cooked[2, 4, 5, 9, 27, 183]. When well grown, the cooked root has a very tender texture, though it is rather chewy raw[K]. It is best harvested after there have been some autumn frosts because it will have developed a sweeter flavour[61]. The root is delicious baked, it can also be used in soups etc and can be added to cakes, pies and puddings[183]. Leaves and young shoots - cooked with other greens as a vegetable or added to soups etc[9, 183]. Used in early spring[9]. The seed is used as a condiment[9]. Similar in taste to dill[183].

tcanta Insecticide RepellentThe leaves and roots are used to make an insect spray[20]. Roughly chop the leaves and roots, put them in a basin with enough water to cover, leave them overnight then strain and use as an insecticide against aphids and red spider mite[201].

dwatta Poultrice Women's complaintsA tea made from the roots has been used in the treatment of women's complaints[222]. A poultice of the roots has been applied to inflammations and sores[222]. The root contains xanthotoxin, which is used in the treatment of psoriasis and vitiligo[222]. Xanthotoxin is the substance that causes photosensitivity (see note above on toxicity)[222].

nrakta Europe, including Britain, from Norway south and east to Spain, the Caucasus and Altai. ksakta Road-sides and grassy waste places, especially on chalk and limestone[17].

propta Seed - sow from late winter to late spring in situ. Seed can be slow to germinate, especially from the earlier sowings[200], it is best to mark the rows by sowing a few radishes with the parsnips. The seed has a short viability, very few will still be viable 15 months after harvesting[200].

nwatta Succeeds in most ordinary well-drained soils[16]. Requires an open situation[37]. Prefers a deep rich soil that is not too stiff[1]. The parsnip is often cultivated in the temperate zone for its edible root, there are a number of named varieties[46, 183, 200]. Normally cultivated as a winter root crop, some cultivars are faster to mature and can be available in late summer[200]. The roots are very frost hardy and can be left in the ground to be harvested as required, though they can also be lifted in the autumn and stored for a few months[200]. The flowers are very attractive to hover flies and predatory wasps[201]. Plants have

2.6°C and a pH of 4.2 to 8.2[269]. Sugar beet is widely cultivated as a commercial sugar crop in temperate climates. About one third of all sugar production in the world is derived from this plant[269]. It is not usually grown on a garden scale. There are several named varieties[46].

5.2.91 *Lilium lancifolium*

Tiger Lily, Devil Lily

4 tlin 8 cyuc 4 kcaok 0 tcan 2 dwat 1.2 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis
hpa7tmwatli dyatxre7t hjonli

drudda *Lilium lancifolium* is a BULB growing to 1.2 m (4ft) by 0.3 m (1ft in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from August to September, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The pollen is said to be poisonous, producing vomiting, drowsiness and purging[4].

kckahta Edible Parts: Flowers RootEdible Uses: Bulb - cooked[2, 4, 42, 47]. Somewhat bitterish[105]. Fairly pleasant, when properly cooked they are highly esteemed as a vegetable and somewhat resemble parsnips in flavour[183]. The bulbs are up to 8cm in diameter[266]. They are a good source of starch[105, 183]. The bulb can be dried and ground into powder. Flowers - raw or cooked. Used fresh or dried in salads, soups, rice dishes etc[183].

dwatta Antiinflammatory Cardiac Carminative Diuretic Emmenagogue Emollient Expectorant Ophthalmic Women's complaintsThe bulb is antiinflammatory, diuretic, emmenagogue, emollient and expectorant[240, 279]. They are used to relieve heart diseases, pain in the cardiac region and angina pectoris[240]. They are used in Korea to treat coughs, sore throats, palpitations and boils[279]. The flowers are carminative[240]. They are used to strengthen the eye-lid muscles and are commended in the treatment of myopic astigmatism[240]. A tincture made from the flowering plant, harvested when in full flower, is used in the treatment of uterine neuralgia, congestion, irritation and the nausea of pregnancy[4]. It relieves the bearing-down pain accompanying uterine prolapse and is an important remedy in ovarian neuralgia[4].

nrakta E. Asia - China, Japan, Korea. ksacta Long cultivated and not known in a truly wild situation, though it can naturalise in woodlands[279]. Possibly of hybrid origin involving *L. leichlinii* and *L. maculatum*[90].

propta Seed - this species is completely sterile and does not produce seed. Division with care in the autumn once the leaves have died down. Replant immediately[200]. Bulb scales can be removed from the bulbs in early autumn. If they are kept in a warm dark place in a bag of moist peat, they will produce bulblets. These bulblets can be potted up and grown on in the greenhouse until they are large enough to plant out[200]. Bulbils - gather in late summer when they start to fall off the stems and pot up immediately. Grow on in a greenhouse until large enough to go outside[200]. Plants can flower in three years from bulbils[4].

nwatta Landscape Uses:Border, Container, Foundation, Massing, Seashore. Prefers an open free-draining humus-rich loamy soil with its roots in the shade and its head in the sun[200]. Prefers a lime-free soil according to some reports[28, 47, 143], whilst one says that it succeeds in a calcareous soil[1] and another that it succeeds in ordinary garden soil[1, 42]. Prefers a deep acid loam[47]. Likes a sunny position according to one report[143] whilst others say that it is best grown in open woodland or amongst dwarf evergreen shrubs[1]. Stem rooting, the bulbs should be planted 15 - 20cm deep[143]. Early to mid autumn is the best time to plant out the bulbs in cool temperate areas, in warmer areas they can be planted out as late as late autumn[200]. Plants grow well in northern gardens in Britain[90]. A sterile triploid species, probably of hybrid origin[90]. A very ornamental plant[1], it is cultivated for its edible bulb in Japan[2, 42, 163]. This species tolerates virus infections, but it can transmit them to other species in this genus and so is best

5.2.90 *Beta vulgaris altissima*

Sugar Beet

4 tlin 8 cyuc 4 kcaok 0 tcan 2 dwat 1.5 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis
hpa7tmwatli xre7t hjonli

drudda *Beta vulgaris altissima* is a BIENNIAL growing to 1.5 m (5ft) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It cannot grow in the shade. It prefers moist soil.

kckahta Edible Parts: Leaves RootEdible Uses: SweetenerRoot - raw or cooked. The root contains 16 - 20% sugar and this is often extracted and used as a sweetener[142]. This plant is a major source of sugar in many temperate areas. The root can also be used as a vegetable. When cooked it is quite tender, but with some fibrous strands. It has a very sweet flavour that some people find too sweet[K]. The raw root is rather tough, but makes a pleasant addition to salads when grated finely[K]. Leaves - raw or cooked. A very acceptable spinach substitute[K]. Some people dislike the raw leaves since they can leave an unpleasant taste in the mouth[K].

tcanta BiomassSugar beet has excellent potential as a biomass crop, both as a source of sugar and also using the plant residue for fuel[269].

dwatta Antitumor EmmenagogueAlthough little used in modern herbalism, beet has a long history of folk use, especially in the treatment of tumours[269]. A decoction prepared from the seed has been used as a remedy for tumours of the intestines. The seed, boiled in water, is said to cure genital tumours[269]. The juice or other parts of the plant is said to help in the treatment of tumours, leukaemia and other forms of cancer such as cancer of the breast, oesophagus, glands, head, intestines, leg, lip, lung, prostate, rectum, spleen, stomach, and uterus[269]. Some figure that betacyanin and anthocyanin are important in the exchange of substances of cancer cells; others note two main components of the amines, choline and its oxidation product betaine, whose absence produces tumours in mice[269]. The juice has been applied to ulcers[269]. A decoction is used as a purgative by those who suffer from haemorrhoids in South Africa[269]. Leaves and roots used as an emmenagogue[269]. Plant effective in the treatment of feline ascariasis[269]. In the old days, beet juice was recommended as a remedy for anaemia and yellow jaundice, and, put into the nostrils to purge the head, clear ringing ears, and alleviate toothache[269]. Beet juice in vinegar was said to rid the scalp of dandruff as scurf, and was recommended to prevent falling hair[269]. Juice of the white beet was said to clear obstructions of the liver and spleen[269]. Culpepper (1653) recommended it for treating headache and vertigo as well as all affections of the brain[269].

nrakta A cultivated form of *B. vulgaris maritima* that is grown for the sugar content of its root. ksacta Not known in a truly wild situation.

propta Seed - sow April in situ.

nwatta Beets grow well in a variety of soils, growing best in a deep, friable well-drained soil abundant with organic matter, but doing poorly on clay. They prefer an open position and a light well-drained soil[52]. The optimum pH is 6.0 - 6.8, but neutral and alkaline soils are tolerated in some areas. Some salinity may be tolerated after the seedling stage. Beets are notable for their tolerance to manganese toxicity. Beet is reported to tolerate an annual precipitation of 23 to 315cm, an average annual temperature range of 5.0 to

rown away from any of the other species[47]. The plant should be protected against rabbits and slugs in early spring. If the shoot tip is eaten out the bulb will not grow in that year and will lose vigour[200]. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

5.2.92 *Allium cepa aggregatum*

Potato Onion

4 tlin 8 cyuc 4 kcaak 3 tcan 3 dwat 1.2 m hkuc
htut cyutli tcup hwicli hrasljut hpa7tli flatprikliwslip
hpa7tmwatli xre7t hjonli

drutta *Allium cepa aggregatum* is a BULB growing to 1.2 m (4ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers moist soil.

pcista There have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of this plant. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Bulb - raw or cooked[4, 33]. A nice onion flavour, when chopped up finely they make a nice addition to salads and can also be used as a cooked vegetable or as a flavouring in cooked foods[K]. Some of the cultivars are considered to be gourmet onions[183]. Leaves - raw or cooked. A strong onion flavour[K]. Flowers - raw. Used as a garnish on salads. The flowers are somewhat dry and are less pleasant than many other species[K].

tcanta Cosmetic Dye Hair Polish Repellent Rust The juice of the plant is used as a moth repellent and can also be rubbed onto the skin to repel insects[7]. The plant juice can be used as a rust preventative on metals and as a polish for copper and glass[7]. A yellow-brown dye is obtained from the skins of the bulbs[141, 168]. Onion juice rubbed into the skin is said to promote the growth of hair and to be a remedy for baldness[7]. It is also used as a cosmetic to get rid of freckles[7]. The growing plant is said to repel insects and moles[201]. A spray made by pouring enough boiling water to cover 1kg of chopped unpeeled onions is said to increase the resistance of other plants to diseases and parasites[201].

dwatta Anthelmintic Antiinflammatory Antiseptic Antispasmodic Carminative Diuretic Expectorant Febriifuge Hypoglycaemic Hypotensive Lithontripic Skin Stomachic Tonic Although rarely used specifically as a medicinal herb, the onion has a wide range of beneficial actions on the body and when eaten (especially raw) on a regular basis will promote the general health of the body. The bulb is anthelmintic, anti-inflammatory, antiseptic, antispasmodic, carminative, diuretic, expectorant, febriifuge, hypoglycaemic, hypotensive, lithontripic, stomachic and tonic[4, 7, 21]. When used regularly in the diet it offsets tendencies towards angina, arteriosclerosis and heart attack[254]. It is also useful in preventing oral infection and tooth decay[254]. Baked onions can be used as a poultice to remove pus from sores[254]. Fresh onion juice is a very useful first aid treatment for bee and wasp stings, bites, grazes or fungal skin complaints[7, 201]. When warmed the juice can be dropped into the ear to treat earache[254]. It also aids the formation of scar tissue on wounds, thus speeding up the healing process, and has been used as a cosmetic to remove freckles[7].

nrakta Not known in wild. ksakta Not known in wild.
propta Seed - sow spring in a cold frame. Seed is seldom produced by this plant[4]. Division in late summer. Harvest

the bulbs as the foliage dies down and store them in a cool place. In areas with mild winters the bulbs are traditionally replanted on the shortest day of the year, but in colder areas it is best to wait until late winter or even early spring[4]. Plant the bulbs only just below the soil surface[4].

nwatta Prefers a sunny sheltered position in a light well-drained fertile soil[1] but tolerates most soils. Tolerates a pH in the range 4.5 to 8.3. The potato onion was at one time fairly widely grown as a vegetable, but it has now fallen into virtual disuse[16]. There are still some named forms available[183]. This is a genuinely perennial form of *A. cepa*, the bulb grows deeper in the soil and divides to produce a number of underground bulbs each year in much the same way as shallots. Large bulbs divide to form 5 - 15 bulbs whilst smaller bulbs grow into one large bulb[160]. According to one report, the bulbs should be planted fairly deeply[1] whilst another report says that they should be planted just below soil level[4]. Onions grow well with most plants, especially roses, carrots, beet and chamomile, but they inhibit the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. The plant is heat tolerant in zones 12 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

5.2.93 *Cryptotaenia japonica*

Mitsuba, Japanese honewort

4 tlin 8 cyuc 4 kcaak 0 tcan 1 dwat 1 m hkuc
pcimhmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flat-
prikliw hpa7tmwatli fyfxre7t hjonli

drutta *Cryptotaenia japonica* is an evergreen Perennial growing to 1 m (3ft 3in) by 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 5. It is in leaf all year, in flower from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Leaves Root Stem Edible Uses: Condiment Leaves and stems - raw or cooked[2, 52, 116]. Used as a flavouring with a parsley-like flavour if you let your imagination run away with you[K]. Seedlings and young leaves can be used in salads[206]. When cooking, the leaves should not be cooked for more than a couple of minutes or the flavour is destroyed[206]. The leaves contain about 2.3% protein, 0.23% fat, 4.4% carbohydrate, 2.1% ash[179]. Root - raw or cooked[2, 52, 116, 183]. Blanched stem - a celery substitute[2, 116]. The seed is used as a seasoning.

dwatta Febriifuge Tonic Women's complaints Women's complaints. Used in the treatment of haemorrhages, colds, fevers etc[178]. Used as a tonic for strengthening the body[266].

nrakta E. Asia - China, Japan. ksakta Woodland in hills and mountains[52, 58].

propta Seed - sow April in a greenhouse. Germination is usually rapid, prick out the seedlings into individual pots when they are large enough to handle and plant them out in early summer. The ideal temperature for sowing is about 25°C, though seed does germinate at higher and lower temperatures[206]. Seed can also be sown in early autumn[206]. Division in spring or autumn.

nwatta Succeeds in most soils, preferring a moist shady position under trees where it often self-sows[52]. The leaves tend to turn yellow when plants are grown in full sun[206].

This species is not winter-hardy in all areas of Britain, though plants can tolerate short periods at temperatures down to -10°C[206]. Mitsuba is commonly cultivated as a vegetable in Japan, there are some named varieties[183]. It is usually grown as an annual[206]. It is closely allied to *C. canadensis*, and is considered to be no more than a synonym of that species by some botanists[200]. This plant is adored by slugs and snails and must be protected when small or when new growth is emerging in the spring[K]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.2.94 *Aralia cordata*

Udo

4 tlin 9 cyuc 4 kcaak 0 tcan 2 dwat 1.8 m hkuc
pcimhmim cyutli tcup hwicli hyishrasjlutnyik hpa7tli flat-prikrlwis hpa7tmwatli xre7t hjonli

drutta *Aralia cordata* is a PERENNIAL growing to 1.8 m (6ft). See above for USDA hardiness. It is hardy to UK zone 5 and is frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

ksakta Edible Parts: Root Edible Uses: Coffee Root Shoots Stem Edible Uses: Young branched shoots - cooked or raw[2, 46, 61, 105, 177, 279]. They can be up to 1.5 metres long and have a mild and agreeable flavour[116]. They are usually blanched and are crisp and tender with a unique lemon-like flavour[183]. They can be sliced and added to salads, soups etc[206]. The shoots contain about 1.1% protein, 0.42% fat, 0.8% soluble carbohydrate, 0.55% ash[179]. Root - cooked[22, 105, 177]. Used like scorzonera[2].

dwatta Analgesic Antiinflammatory Carminative Diuretic Febrifuge Stimulant Stomachic Tonic The root is sometimes used in China as a substitute for ginseng (*Panax* species)[218]. It is said to be analgesic, antiinflammatory, carminative, diuretic, febrifuge, stimulant, stomachic and tonic[218, 279]. The root contains an essential oil, saponins, sesquiterpenes and diterpene acids[279]. It is used in Korea to treat the common cold and migraines[279].

nrakta E. Asia - China, Japan, Korea. ksakta Thickets and thin woods, esp. by streams and ravines, all over Japan[58, 275].

propta Seed - best sown as soon as ripe in a cold frame. Stored seed requires 3 - 5 months of cold stratification. Germination usually takes place within 1 - 4 months at 20°C[134]. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in a greenhouse for at least their first winter. Once the plants are 25cm or more tall, they can be planted out into their permanent positions, late spring or early summer being the best time to do this. Root cuttings 8cm long, December in a cold frame[11, 78]. Store the roots upside down in sand and pot up in March/April. High percentage[78]. Division of suckers in late winter[11]. Very easy, the suckers can be planted out direct into their permanent positions if required.

nwatta Prefers a good deep loam and a semi-shady position[1, 134]. Requires a sheltered position[1]. Plants are hardier when grown in poorer soils[200]. Tolerates a pH in the range 5.0 to 7.4. Dormant plants are hardy to about -25°C[187]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. This is a commonly cultivated food crop in Japan, where it is grown for its edible shoots. There are several named varieties[2, 46, 58, 116]. The plant is heat tolerant in zones 9 through 6. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to

suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2].

5.2.95 *Sium sisarum*

Skirret, Suikerwortel (Netherlands), Crummock (Scotland), Zuckewurzel (Germany)

4 tlin 9 cyuc 4 kcaak 0 tcan 0 dwat 1 m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli flatprikrlwis hpa7tmwatli fyifxre7t hjonli

drutta *Sium sisarum* is a PERENNIAL growing to 1 m (3ft 3in) by 0.4 m (1ft 4in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf from March to November, in flower in July, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Root Edible Uses: Coffee Root or cooked[2, 4, 14, 33]. Firm, sweet and floury[27] but with a small woody core[160, K]. The roots have a very acceptable taste raw, that is somewhat like a cross between carrots and parsnip but with a nutty flavour. They can also be boiled, baked or added to soups etc[183, K]. The roasted root has been used as a coffee substitute[46, 61, 183].

nrakta Original habitat is obscure, possibly in E. Europe or Asia. ksakta Not known in a truly wild situation but found as an escape from cultivation in damp places[50].

propta Seed - sow late winter to early spring in a cold frame[1, 33]. It can be slow to germinate. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer if they are large enough. Otherwise, grow them on in a cold frame for their first winter and plant them out in the following spring. The seed is best sown in early April in situ[1, 33]. Division in early spring just before new growth begins. Use the side roots to produce new plants[1]. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta Prefers a light, rich, moisture retentive soil in full sun[1, 33, 37]. Requires an abundance of moisture in the growing season or the roots will be tough[27, 37]. Plants are tolerant of some shade[244]. Plants seem to be resistant to all insects and diseases[160]. Skirret was at one time often grown for its edible root but has fallen into virtual disuse[2, 50, 61]. This is a shame since the root is very tasty, easy to grow and relatively productive[K]. The form *S. sisarum* should be used, its root is fleshy and succulent, *S. sisarum lancifolium*. (Bieb.) Thell. is sometimes offered but is unlikely to produce roots of culinary quality[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

5.2.96 *Rumex alpinus*

Alpine Dock, Munk's rhubarb

4 tlin 8 cyuc 4 kcaak 1 tcan 2 dwat 1.2 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikrlwis hpa7tmwatli xre7t hjonli

drutta *Rumex alpinus* is a PERENNIAL growing to 1.2 m (4ft) by 0.3 m (1ft in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly

acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Plants can contain quite high levels of oxalic acid, which is what gives the leaves of many members of this genus an acid-lemon flavour. Perfectly alright in small quantities, the leaves should not be eaten in large amounts since the oxalic acid can lock-up other nutrients in the food, especially calcium, thus causing mineral deficiencies. The oxalic acid content will be reduced if the plant is cooked. People with a tendency to rheumatism, arthritis, gout, kidney stones or hyperacidity should take especial caution if including this plant in their diet since it can aggravate their condition[238].

kcakta Edible Parts: Leaves**Edible Uses:** Leaves - raw or cooked[1, 2, 5, 21, 22, 46, 183]. They can also be dried for later use[12]. A strong flavour, the leaves can be used in salads in late autumn to the spring, but are better cooked like spinach[K]. The fresh leaves can be available for most months of the year, only dying down for a short period in severe winters[K]. The leaves often become bitter in the summer[K]. In taste trials, this has proved to be a very popular autumn and spring cooked leaf, making an excellent spinach[K].

tcanta DyeDark green to brown and dark grey dyes can be obtained from the roots, they do not need a mordant[168].

dwatta Astringent LaxativeThe root is astringent and laxative[4, 9]. It has a regulatory effect on the digestive system, similar to but weaker than rhubarb (Rheum rhabarbaricum)[4]. It can act either as a laxative or a cure for diarrhoea according to dosage[4]. The root is harvested in early spring and dried for later use[4].

nrakta C. and S. Europe to W. Asia. Naturalized in Britain[17]. **ksacta** Along the banks of streams and by the sides of roads, it is also found near human habitations, in hilly areas[9].

propta Seed - sow spring in a cold frame. The seed can also be sown as soon as it is ripe when it will germinate rapidly and will provide edible leaves from early spring the following year. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. Division in spring. Division is easy at almost any time of the year, though the plants establish more rapidly in the spring[K]. Use a sharp spade or knife to divide the rootstock, ensuring that there is at least one growth bud on each section of root. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta A very easily grown and tolerant plant[K], it succeeds in most soils, preferring a moist moderately fertile well-drained soil in a sunny position[200]. Hardy to about -20°C[187]. Alpine dock was at one time cultivated for its edible leaves, though it has now fallen out of favour to be replaced by less strong-tasting plants[2, 200, K]. This is a pity because it is a very productive and useful vegetable and can produce its leaves all through the winter if the weather is not too severe[K]. A very important plant for the caterpillars of many species of butterflies[30].

5.2.97 *Amaranthus blitum*

Slender Amaranth, Purple amaranth

4 tlin 8 cyuc 4 kcaak 2 tcan 2 dwat 1 m hkuc

htut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikwis hpa7tmwatli fyif hjonli

drutta *Amaranthus blitum* is an ANNUAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from April to October, in flower in August, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It cannot grow in the shade. It prefers moist soil.

pcista No members of this genus are known to be poisonous, but when grown on nitrogen-rich soils they are known to concentrate nitrates in the leaves. This is especially noticeable on land where chemical fertilizers are used. Nitrates are implicated in stomach cancers, blue babies and

some other health problems. It is inadvisable, therefore, to eat this plant if it is grown inorganically.

kcakta Edible Parts: Leaves**SeedEdible Uses:** ColouringLeaves - raw or cooked as a spinach[2, 4, 55, 183]. The leaves contain about 3.88% protein, 1.1% fat, 9.38% carbohydrate, 3.2% ash, 323mg Ca, 8.3mg Fe, they are very rich in Vitamins A and C, rich in vitamin B1[179]. The leaves are used as a potheb in order to remove poison from the system[218]. Seed - cooked. Used as a cereal substitute in cakes, porridge etc[55, 183]. Very small, about 1.2mm in diameter[266], but it is easy to harvest and very nutritious. The seed can be cooked whole, and becomes very gelatinous like this, but it is rather difficult to crush all of the small seeds in the mouth and thus some of the seed will pass right through the digestive system without being assimilated[K]. An edible dye is obtained from the seed capsules[4].

tcanta DyeYellow and green dyes can be obtained from the whole plant[168].

dwatta AstringentA fluid extract of the plant is used as an astringent internally in the treatment of ulcerated mouths and throats, externally as a wash for ulcers and sores[4]. The juice of the roots is used externally to relieve headaches[272]. The plant has a folk reputation for being effective in the treatment of tumours and warts[218].

nrakta Temperate and Tropical zones. **ksacta A** cosmopolitan weed growing on waste ground[58, 204].

propta Seed - sow late spring in situ. An earlier sowing can be made in a greenhouse and the plants put out after the last expected frosts. Germination is usually rapid and good if the soil is warm[133]. A drop in temperature overnight aids germination[133]. Cuttings of growing plants root easily[206].

nwatta Often cultivated, especially the form *oleraceus*, the plant succeeds from the temperate zone through to the tropics. It grows best in areas where annual daytime temperatures are within the range 21 - 27°C, but can tolerate 18 - 32°C[418]. It can be killed by temperatures of 4°C or lower[418]. It prefers a mean annual rainfall in the range 1,200 - 1,500mm, but tolerates 200 - 2,700mm[418]. Prefers a well-drained fertile soil in a sunny position[200]. Requires a hot sheltered position if it is to do well[K]. Prefers a pH in the range 5.5 - 7, tolerating 4.3 to 7.5[418]. The plant has become a weed in many areas of the world outside its original range. It is classified as 'Invasive' in many Pacific Islands[305]. Plants are particularly susceptible to attacks by leaf-chewing insects[298]. Plants should not be given inorganic fertilizers, see notes above on toxicity. This plant was cultivated by the ancient Romans and Greeks for its edible leaves, there are some named varieties[183]. Most if not all members of this genus photosynthesize by a more efficient method than most plants. Called the 'C4 carbon-fixation pathway', this process is particularly efficient at high temperatures, in bright sunlight and under dry conditions[196]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is clumping, giving the plant a clumping habit. The predictable growth behaviour makes it easier to maintain without having to apply containment methods[2-1].

5.2.98 *Ribes burejense*

Bureja gooseberry,

4 tlin 8 cyuc 4 kcaak 0 tcan 0 dwat 1 m hkuc

hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

drutta *Ribes burejense* is a deciduous Shrub growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in April, and the seeds ripen from July to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit**Edible Uses:** Fruit - raw or cooked[105]. Acid but palatable, it is a gooseberry and can hang on the bush until November if the birds leave it alone[K]. At this time of year it develops a rather nice blackcurrant flavour[K]. The fruit is about 10mm in diameter[200].

nrakta Northern N. America - Alaska to N. Asia - Manchuria to N. Korea. ksacta Mountain coniferous forests, slopes and stream banks[74].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 3 months cold stratification at 2 to 5°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. Quite tolerant of shade though not fruiting so well in such a position[11]. Hardy to about -20°C[200]. Plants can harbour a stage of 'white pine blister rust', so they should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200].

5.2.99 *Hordeum distichon*

Two-Rowed Barley

4 tlin 8 cyuc 4 kcak 0 tcan 3 dwat 1.2 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Hordeum distichon* is an ANNUAL growing to 1.2 m (4ft). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Seed Edible Uses: Coffee Salt Sweetener Seed - cooked. The seed can be ground into a flour and used as a cereal in making bread, porridge etc[1, 4, 34, 46]. Malt is obtained by sprouting and roasting the seed, then boiling the seed. The resulting liquid is a sweet substance that is used in making beer and as a food[4, 46]. The longer the seed is roasted, the darker this liquid will be. The roasted (unsprouted) seed is used as a coffee and a salt substitute[46].

tcanta Biomass Mulch Paper The stems, after the seed has been harvested, have many uses. They are a source of fibres for making paper, a biomass for fuel etc, they can be shredded and used as a mulch[141, 171].

dwatta Antidiarrhoeal Demulcent Nutritive Urinary Barley grain is an excellent food for convalescence, either in the form of porridge or as a decoction of the seed. It is soothing to the throat and provides easily assimilated nutrients[4, 254]. It can also be taken to clear catarrh. Its demulcent properties soothe inflammation of the gut and urinary tract[254]. It is commonly given to children suffering minor infections or diarrhoea and is particularly recommended as a treatment for feverish states and in catarrhal affections of the respiratory and urinary organs[4, 254]. Made into a poultice, the seed is an effective remedy for soothing and reducing inflammation in sores and swellings[254]. Modern research has shown that barley may be of aid in the treatment of hepatitis, whilst other trials have shown that it may help to control diabetes[254]. Barley bran may have the effect of lowering blood cholesterol levels and preventing bowel cancer[254].

nrakta Of uncertain origin, possibly a hybrid between *H. spontaneum* and a 6-rowed barley[34]. ksacta Not known in the wild. Occurs as a relict of cultivation in Britain but it does not persist[17].

propta Seed - sow in situ in March or October and only just cover the seed. Make sure the soil surface does not dry out if the weather is dry. Germination takes place within 2 weeks.

nwatta Succeeds in most soils and in climates ranging from sub-arctic to sub-tropical[1, 171]. Easily grown in light soils[162]. Widely cultivated in temperate zones, especially in cooler or moister areas, for its edible seed[1, 50,

171]. There are many named varieties. This species is sometimes considered to be no more than a sub-species of *H. vulgare*[61].

5.2.100 *Hemerocallis exaltata*

4 tlin 8 cyuc 4 kcak 0 tcan 1 dwat 1 m hkuc
hmimhtut cyutli kyucptup hwicli hrasjlutnyik frip hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Hemerocallis exaltata* is a PERENNIAL growing to 1 m (3ft 3in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcakta Edible Parts: Flowers Leaves Edible Uses: Leaves and young shoots - cooked[116, 205]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. They can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - Japan, it is only found on Tobishima Island, a small islet off W. Japan. ksacta Meadows[187].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil[200, 205]. Grows well in heavy clay soils. Succeeding in sun or shade, it produces more flowers in a sunny position though these flowers can be short-lived in very sunny positions[205]. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. This species is hardy to about -15°C[187]. Hybridizes freely with other members of this genus[200]. Some roots are short and enlarged, others long with spindle-shaped tuberous ends. The plant forms a compact clump[233], but it also produces rhizomes that tend to spread[205]. Individual flowers are very short-lived, they open in the morning and wither in the evening[205]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

5.2.101 *Hordeum vulgare*

Barley, Common barley

4 tlin 8 cyuc 4 kcak 0 tcan 3 dwat 1 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Hordeum vulgare* is an ANNUAL growing to 1 m (3ft 3in) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade.

It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista Exposure to barley flour can cause asthma. Possible trigger for coeliac disease. Possible hypersensitivity to barley [301].

kcakta Edible Parts: Seed Edible Uses: Coffee Drink Salt Sweetener Seed - cooked as a whole grain or ground up and used as a flour for making bread, porridges etc [2, 7, 46, 183]. It has a low gluten content and so is unsuitable for making wheat-type breads [238, K]. The seed can be fermented into sourdough and many other fermented foods such as 'tempeh' and 'miso' [183]. The seed can also be sprouted and added to salads or the sprouted seed juiced and the juice drunk as a health-food drink [183]. The decorticated seed is called pearl barley. This is no longer viable since the decortication process damages the embryo. It is used in soups, stews etc [238]. Malt is obtained by sprouting the whole seed and then roasting it. The seed is then ground into a flour and boiled in water. The resulting liquid is very sweet and can be used in making beer or other drinks, and as a nutritious sweetener in various foods [7, 46]. The roasted (unsprouted) seed is used as a coffee [46, 183] and a salt substitute.

tcanta Biomass Mulch Paper The stems, after the seed has been harvested, have many uses. They are a source of fibres for making paper, a biomass for fuel etc, they can be shredded and used as a mulch [141, 171].

dwatta Abortifacient Cancer Carminative Demulcent Digestive Diuretic Emollient Expectorant Febrifuge Galactofuge Hypoglycaemic Lenitive Nutritive Poulitice Stomachic The shoots are diuretic [218]. The seed sprouts are demulcent, expectorant, galactofuge, lenitive and stomachic [176, 218]. They are sometimes abortifacient [218]. They are used in the treatment of dyspepsia caused by cereals, infantile lacto-dyspepsia, regurgitation of milk and breast distension [176]. They are best not given to a nursing mother since this can reduce milk flow [176]. The seed is digestive, emollient, nutritive, febrifuge and stomachic [218]. It is taken internally as a nutritious food or as barley water (an infusion of the germinated seed in water) and is of special use for babies and invalids [238]. Its use is said to reduce excessive lactation [238]. Barley is also used as a poultice for burns and wounds [4, 46, 176, 218]. The plant has a folk history of antitumour activity [218]. The germinating seed has a hypoglycaemic effect preceded by a hyperglycaemic action [218]. Modern research has shown that barley may be of aid in the treatment of hepatitis, whilst other trials have shown that it may help to control diabetes [254]. Barley bran may have the effect of lowering blood cholesterol levels and preventing bowel cancer [254]. Other uses for bronchitis and diarrhoea, and as a source of folic acid and vitamin B12 and B6. Weight loss [301].

nrakta Of uncertain origin. **ksacta** Not known in the wild, it is found in Britain as a relic of cultivation but does not persist [17].

propta Seed - sow in situ in March or October and only just cover the seed. Make sure the soil surface does not dry out if the weather is dry. Germination takes place within 2 weeks.

nwatta Staple Crop: Balanced carb Under Development Succeeds in most soils and in climates ranging from sub-arctic to sub-tropical [1, 171]. Easily grown in light soils [162]. Prefers a calcareous soil [7]. Best grown in a sunny position [238]. Barley first came under cultivation about 12,000 years ago [238]. It is widely cultivated in Temperate areas of the world for its edible seed, there are many named varieties [57, 183]. It succeeds further north than most other cereal crops (it succeeds in Norway at latitude 70° N [142]), and at higher altitudes (it is a staple crop in Tibet) [57, 238]. The Coeleste group contains the hull-less barleys. Although lower yielding than the type, these hull-less seeds are much easier to harvest making them a much easier crop to grow on a small scale [183].

5.2.102 Rosa villosa

Apple Rose

4 tlin 8 cyuc 4 kcak 1 tcan 1 dwat 1.8 m hkuc
hmmhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikli-
wis hpa7tmwotli fyifxre7t hjonli

dwatta *Rosa villosa* is a deciduous Shrub growing to 1.8 m (6ft). See above for USDA hardiness. It is hardy to UK

zone 5. It is in flower from June to August, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista There is a layer of hairs around the seeds just beneath the flesh of the fruit. These hairs can cause irritation to the mouth and digestive tract if ingested.

kcakta Edible Parts: Fruit Seed Edible Uses: Tea Fruit - raw or cooked [2, 3, 46, 61, 105]. A pleasant acid pulp, the fruit can also be used in preserves, jams etc [183]. The fruit is about 30mm in diameter [200], but there is only a thin layer of flesh surrounding the many seeds [K]. Rich in vitamin C, there is 1303mg per 100g (fresh weight) of fruit [142]. Some care has to be taken when eating this fruit, see the notes above on known hazards. The seed is a good source of vitamin E, it can be ground into a powder and mixed with flour or added to other foods as a supplement [102, 183]. Be sure to remove the seed hairs [102]. The leaves are used as a tea substitute [46, 61, 183]. A pleasant tasting fruity-flavoured tea is made from the dried fruit [21, 46].

dwatta Cancer Vitamin C The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavonoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers [214].

nrakta Europe, including Britain, from Scandinavia south and east to Spain, the Caucasus, W. Asia to Iran. **ksacta** Woods, hedgerows, scrub etc [17].

propta Seed. Rose seed often takes two years to germinate. This is because it may need a warm spell of weather after a cold spell in order to mature the embryo and reduce the seedcoat [80]. One possible way to reduce this time is to scarify the seed and then place it for 2 - 3 weeks in damp peat at a temperature of 27 - 32°C (by which time the seed should have imbibed). It is then kept at 3°C for the next 4 months by which time it should be starting to germinate [80]. Alternatively, it is possible that seed harvested 'green' (when it is fully developed but before it has dried on the plant) and sown immediately will germinate in the late winter. This method has not as yet (1988) been fully tested [80]. Seed sown as soon as it is ripe in a cold frame sometimes germinates in spring though it may take 18 months. Stored seed can be sown as early in the year as possible and stratified for 6 weeks at 5°C [200]. It may take 2 years to germinate [200]. Prick out the seedlings into individual pots when they are large enough to handle. Plant out in the summer if the plants are more than 25cm tall, otherwise grow on in a cold frame for the winter and plant out in late spring. Cuttings of half-ripe wood with a heel, July in a shaded frame. Overwinter the plants in the frame and plant out in late spring [78]. High percentage [78]. Cuttings of mature wood of the current seasons growth. Select pencil thick shoots in early autumn that are about 20 - 25cm long and plant them in a sheltered position outdoors or in a cold frame [78, 200]. The cuttings can take 12 months to establish but a high percentage of them normally succeed [78]. Division of suckers in the dormant season. Plant them out direct into their permanent positions. Layering. Takes 12 months [11].

nwatta Succeeds in most well-drained soils [11], preferring a circumneutral soil and a sunny position [200]. Grows well in heavy clay soils. Dislikes water-logged soils [200]. Grows well with alliums, parsley, mignonette and lupins [18, 20]. Garlic planted nearby can help protect the plant from disease and insect predation [18, 20]. Grows badly with boxwood [18]. Formerly cultivated for its edible fruit which, from selected plants, can be 4cm wide [11]. There are some named varieties, 'Wolley Dod' has large fruits with a good flavour [183]. The flowers are semi-double, heavily scented and sweetly fragrant [183]. The foliage has an aroma like ripe apples [245]. Plants often produce suckers [200]. Hybridizes freely with other members of this genus [80]. Plants in this genus are notably susceptible to honey fungus [200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) informa-

on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2].

5.2.103 *Campanula glomerata*

Clustered Bellflower, Dane's blood, Clustered Bellflower
4 tlin 9 cyuc 4 kcaok 0 tcan 0 dwat 1 m hkuc
hmmihmtut cyutli tcup hwicli hrasljut hpa7tli flatpriklwisslip
hpa7tmwatli fyifxre7t hjonli

drutta *Campanula glomerata* is a PERENNIAL growing to 1 m (3ft 3in) by 0.6 m (2ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs). The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Flowers Leaves Edible Uses: Leaves - raw or cooked. A mild flavour with a pleasant sweetness, it can be used as a major ingredient in salads[K]. Flowers - raw[K]. Beautiful to look at, they have a pleasant sweetness and make a very attractive decoration to a salad[K].

nrakta Most of Europe, including Britain, to temperate Asia. ksakta Grassy places on calcareous soils, particularly in chalk grassland, less commonly on sea-cliffs or in woods[17].

propta Seed - surface sow spring in a cold frame. The seed usually germinates in 2 - 4 weeks at 18°C. Very easy[221]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Basal cuttings in spring. Very easy[221]. Harvest the shoots when they are about 10 - 15cm long with plenty of underground stem. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer. Division in spring or autumn. Very easy[221], larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the summer or following spring.

nwatta Landscape Uses:Border, Container, Foundation, Massing, Rock garden, Specimen. Prefers a moist but well-drained rich sandy loam and a neutral or alkaline soil in sun or partial shade[1, 200]. Succeeds in any well-drained soil in sun or partial shade[233]. A very ornamental plant, there are several named forms[200]. This is a very vigorous species and can be invasive, spreading by means of its creeping rootstock, when well suited to its site[200]. Members of this genus are rarely if ever troubled by browsing deer[233]. The species in this genus do not often hybridize and so seed can generally be relied upon to come true[221]. The plants are self-fertile[221]. Special Features:Not North American native, Invasive, Attracts butterflies, Suitable for cut flowers. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2].

5.2.104 *Myrrhis odorata*

Sweet Cicely, Anise
4 tlin 8 cyuc 4 kcaok 3 tcan 3 dwat 1 m hkuc
hmmihmtut cyutli tcup hwicli hrasljutnyik hpa7tli flatpriklwis
hpa7tmwatli fyifxre7t hjonli

drutta *Myrrhis odorata* is a PERENNIAL growing to 1 m (3ft 3in) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to June, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Leaves Root Seed Edible Uses: TeaLeaves - raw or cooked[2, 5, 37, 52]. Excellent raw, the leaves have a delicious sweet aniseed flavour[9] and are liked by the majority of people who try them[K]. They are also used as a flavouring for vegetables[183], and are an important ingredient of the herb mix 'bouquet garni'[244]. They can be cooked with tart fruits in order to reduce their acidity[14, 183]. The plant produces fresh leaves from late winter to early the following winter[200]. The leaves can also be dried for later use[21]. It is best to prevent the plant from flowering if the leaves are required for culinary use, because they lose their flavour when the plant is in flower[244]. Root - raw or cooked[1, 2, 5, 14, 37]. A similar flavour to the leaves[K]. So long as it is not too old, the root can be boiled and mixed with other vegetables or added to salads[9]. Seed - raw or cooked[1, 2, 183]. An aniseed flavour, it is usually used as a flavouring[14, 115] but can also be eaten raw whilst it is still green and before the fibrous coat has formed[1, 9]. It makes an excellent mouth freshener[K]. A tea is made from the leaves[183].

tcanta PolishThe leaves and the seed make good polishes for wood[4, 6, 115]. You just rub them over the wood and then rub the wood with a clean cloth to remove any greenness. It is particularly good on oak panels[5], giving a lovely glossy finish and an aromatic smell[244]. Invertebrate shelter, Nectary. Aromatic.

dwatta Antiseptic Aromatic Carminative Expectorant StomachicThe whole plant, including the seed, is aromatic, carminative, expectorant and stomachic[4]. It is useful in the treatment of coughs and flatulence, and also as a gentle stimulant for the stomach[4, 238]. The root is antiseptic and a decoction has been used to treat snake and dog bites[4, 244]. An ointment made from the roots has been used to ease gout and soothe the wounds[244].

nrakta Mountainous regions of Europe, including Britain. ksakta Grassy places, hedges and woods in hilly regions, often near human habitations[4, 9, 17].

propta Seed - best sown as soon as it is ripe since stored seed is difficult to germinate[1]. The seed can be sown in an outdoor seedbed or, if supplies are limited, it can be sown in pots in a cold frame. Thin the seedlings in the outdoor bed as necessary (eat the thinnings) and transplant the young plants into their final positions in the following spring. Prick out the pot-grown seedlings into individual pots when they are large enough to handle and plant them out in spring. Division in spring or autumn. Remove the tapering tap root and cut the remaining root into sections with at least one eye per section and replant in their permanent position.

nwatta Prefers a moist rich soil in a shady position[14, 52, 200]. Thrives in all soils[1] in sun or shade[111, 200]. This species is hardy to about -15°C according to one report[200] whilst another says that it is hardy to at least -20°C[187]. Plants often self-sow freely[200]. Sweet cicely used to be quite widely cultivated as a food plant but is now only occasionally grown in the herb garden. This is a shame since it is an extremely useful and tasty plant to grow and can provide food all year round[K]. A good bee plant[4]. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited

spread [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.2.105 *Ribes rubrum*

Red Currant, Cultivated currant

4 tlin 8 cyuc 4 kcaak 2 tcan 1 dwat 1.2 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flatprikliw hpa7tmwatli fyifxre7t hjonli

drutta *Ribes rubrum* is a deciduous Shrub growing to 1.2 m (4ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to May, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The fresh leaves contain the toxin hydrogen cyanide, though details of quantities are not given[240]. This substance is found in several foods, including almonds. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[1, 2, 5, 11]. A pleasant acid flavour, it can be eaten out of hand but is more often cooked in pies, jams etc[K]. There are rather a lot of seeds in each fruit[K].

tcanta Cosmetic DyeA yellow dye is obtained from the leaves[100]. A black dye is obtained from the fruit[100]. The fruit is used cosmetically in face-masks for firming up tired and lifeless skin[7].

dwatta Antirheumatic Antiscorbutic Aperient Poulitice Refrigerant SialagogueThe fruit is antiscorbutic, aperient, depurative, digestive, diuretic, laxative, refrigerant and sialagogue[4, 7, 21]. The leaves contain the toxin hydrogen cyanide[240]. A concoction of them is used externally to relieve rheumatic symptoms[7]. They are also used in poultices to relieve sprains or reduce the pain of dislocations[7].

nrakta Western Europe, including Britain. ksacta Damp soils in hedges and woods, avoiding acid soils[7, 9, 17].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 3 months cold stratification at between 0 and 5°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. Plants are quite tolerant of shade, even succeeding on a north-facing wall[200], though they do not fruit so well in such a position[11]. Prefers a pH in the range 5.5 to 6[200]. Hardy to about -20°C[200]. Red currants are often cultivated in temperate zones for their edible fruit, there are some named varieties, including forms with white fruits[4, 61]. Most cultivars are self-fertile and set a good crop on their own[200]. The fruit is produced at the base of one-year old and older wood, plants start to fruit at 3 - 4 years from seed[200]. This is an aggregate species comprising *R. spicatum* and *R. rubrum*. There is some confusion in nomenclature with some botanists only recognising 2 species, *R. silvestre*. (syn *R. sativum*) and *R. spicatum* (syn *R. rubrum*)[17, 200]. Plants can harbour a stage of white pine blister rust, so should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2].

5.2.106 *Hemerocallis fulva* longituba

4 tlin 8 cyuc 4 kcaak 2 tcan 1 dwat 1 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flat-prikliw hpa7tmwatli xre7t hjonli

drutta *Hemerocallis fulva* longituba is a PERENNIAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to August. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic[127, 137]. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcakta Edible Parts: Flowers Leaves RootEdible Uses: Leaves and young shoots - cooked[105, 116]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. They can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked[205]. A pleasant nutty flavour.

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - C. and S. Japan ksacta Long cultivated, the plant is not known in the wild

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[200] but tolerating partial shade. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. Unlike the type species, this form does produce viable seed[187]. Plants take a year or two to become established after being moved[200]. Individual flowers are short-lived, opening in the morning and withering in the evening. The plant, however, produces a succession of flowers over a period of about 6 weeks[205]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

5.2.107 *Hemerocallis thunbergii*

4 tlin 8 cyuc 4 kcaak 2 tcan 1 dwat 0.5 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flat-prikliw hpa7tmwatli xre7t hjonli

drutta *Hemerocallis thunbergii* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

ksakta Edible Parts: Flowers Leaves Edible Uses: Leaves and young shoots - cooked[205]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. The flowers can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205]. Attractive Flowers.

dwatta Antidote Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - N. China, Japan, Korea. ksakta Mountains in C. and S. Japan[58].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. Plants take a year or two to become established after being moved[200]. They increase by means of runners[205] and form loose spreading clumps[K]. The roots are not swollen[233]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. The fragrant flowers are very short-lived, they open in the late afternoon and die in the morning[200, 205]. However, plants produce a succession of flowers for several weeks of the summer, each scape carrying between 4 and 20 blooms[205].

5.2.108 *Linum usitatissimum*

Flax, Common flax

4 tlin 8 cyuc 4 kcak 4 tcan 3 dwat 0.7 m hkuc

htut cyutiI tcup hwicli hrasjlut hpa7tli flatpriklwis hpa7tmwatli fyfxre7t hjonli

drutta *Linum usitatissimum* is an ANNUAL growing to 0.7 m (2ft 4in) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to July, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista The seed of some strains contain cyanogenic glycosides in the seed though the toxicity is low, especially if the seed is eaten slowly. It becomes more toxic if water is drunk at the same time[76, 222]. The cyanogenic glycosides are also present in other parts of the plant and have caused poisoning to livestock[240]. Contraindicated with a stricture of the oesophagus in no bowel movement conditions and acute gut inflammatory diseases. Contraindicated in pregnancy. Some suggestion it should be avoided with prostate gland diseases [301].

ksakta Edible Parts: Oil Oil Seed Edible Uses: Coffee Gum Oil Oil Seed - raw or cooked[61]. The seed contains 30 - 40% oil, which comprises mainly linoleic and linolenic acids[238]. The seed also contains cyanogenic glycosides (prussic acid). In small quantities these glycosides stimulate respiration and improve digestion, but in excess can cause respiratory failure and death[238]. Cultivars low in these glycosides have been developed and large quantities of the seed would need to be eaten to achieve a harmful dose. The seed is used in breads and cereals, it can also be sprouted

and used in salads[183]. The seed is hard to digest and provokes flatulence[4]. A nutritional analysis is available[218]. The roasted seed is said to be a coffee substitute[183]. A herbal tea can be brewed from the seed[183]. An edible oil is obtained from the seed[183, 269], though it needs to be properly refined before it can be eaten. Some caution is advised in the use of the seeds for food since some varieties of this plant contain toxins.

tcanta Biomass Fibre Gum Insulation Oil Oil Size A fibre is obtained from the stem[6, 7, 13, 57, 89]. It is of very high quality and is used in making cloth, sails, nets, paper, insulating material etc. The best quality flax fibre is used for making cloth. It is soft, lustrous and flexible, although not so flexible or elastic as cotton or wool[269]. It is stronger than cotton, rayon or wool, but weaker than ramie[269]. Lower quality fibre is used in manufacturing of towelling, matting, rugs, twines, canvas, bags, and for quality papers such as printing currency notes[269]. The plant is harvested just after it flowers[115]. The yield is 0.5 to 0.9 tonnes of fibre per hectare. When used for paper making, the stems are harvested in late summer or autumn when they are two thirds yellow and are then retted[189]. The fibre is then stripped from the stem, cooked for two hours or more with lye and then beaten in a Hollander beater[189]. The lower quality flax straw from seed flax varieties is used in the manufacture of upholstery tow, insulating material, rugs, twine, and paper. Some of the better quality straw is used in the manufacture of cigarette and other high-grade papers[269]. The seed contains 38 - 40% of a drying oil[141]. It has a very wide range of applications. The paint and varnish industries consume about 80% of all the linseed oil produced. The remainder is used in items such as furniture polish, enamels, linoleum, oilcloth, printer's inks, soap making and patent leather[46, 57, 169, 244, 269]. It is also used as a wood preservative and as a waterproofing for raincoats, slickers, and tarpaulins[269]. The oil is also used in a spray on concrete roads to prevent ice and snow from sticking - it has the additional benefit of helping to preserve the concrete and prevent surface cracking and wear[269]. Yields of over 4 tonnes of seed per hectare have been recorded in N. America, but yields of 2 tonnes or less are more common[269]. A mucilage from the soaked or boiled seeds is used as a size for linen warps[169].

dwatta Analgesic Cancer Cardiotoxic Demulcent Emollient Expectorant Laxative Nervine Pectoral Resolvent Urinary VDLinseed has a long history of medicinal use, its main effects being as a laxative and expectorant that soothes irritated tissues, controls coughing and relieves pain[238]. The seed, or the oil from the seed are normally used[238]. The seed is analgesic, demulcent, emollient, laxative, pectoral and resolvent[4, 9, 21, 46, 165, 218, 240]. The crushed seed makes a very useful poultice in the treatment of ulceration, abscesses and deep-seated inflammations[4, 244]. An infusion of the seed contains a good deal of mucilage and is a valuable domestic remedy for coughs, colds and inflammation of the urinary organs[4]. If the seed is bruised and then eaten straight away, it will swell considerably in the digestive tract and stimulate peristalsis[9] and so is used in the treatment of chronic constipation[238]. The oil in the seed contains 4% L-glutamic acid, which is used to treat mental deficiencies in adults[218]. It also has soothing and lubricating properties, and is used in medicines to soothe tonsillitis, sore throats, coughs, colds, constipation, gravel and stones[4, 244]. When mixed with an equal quantity of lime water it is used to treat burns and scalds[244]. The bark and the leaves are used in the treatment of gonorrhoea[240]. The flowers are cardiotoxic and nervine[240]. The plant has a long history of folk use in the treatment of cancer[218]. It has been found to contain various anticancer agents[218]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Linum usitatissimum* for constipation, inflammation of the skin (see [302] for critics of commission E).

nrakta Possibly native to Europe. A rare casual in Britain, the original habitat is obscure. ksakta Not known in the wild.

propta Seed - sow early to late spring in situ. Do not transplant the seedlings[238].

nwatta Prefers a light well-drained moderately fertile humus-rich soil in a sunny sheltered position[200]. Plants grow best in a well-drained, loamy soil, those overlying a clay subsoil produce the best results[269]. They prefer a pH in the range of 5 - 7[269]. Very light highly fertile soils

not desirable as they produce tall rank growth tending to lodge[269]. Plants are more sensitive to salt than most field crops[269]. Prefers a cool moist climate during the growing season, dry weather making the plants short and woody[61, 269]. A very greedy plant, depleting the soil[4, 123] and requiring a rich, well prepared soil if it is to do well[123]. Plants help to break up organic matter and prepare the soil for following crops[201]. Cultivars selected for seed production succeed under a fairly wide range of conditions, but those selected for fibre production require abundant moisture and cool weather during the growing season, and warm dry weather during harvesting, especially where water-retting is practiced[269]. The crop requires 15 - 20cm of rainfall if spread evenly over growing season, with 2.5 cm falling just before or after planting[269]. The plant needs a relatively long ripening period between flowering and harvesting. Warm, dry weather is desirable at the heading stage to cause plants to branch and produce seed; after vegetative growth, dry weather is required for curing the seed[269]. Linseed has a very long history of cultivation in temperate climates with evidence to show that it was being grown in Egypt over 5,000 years ago[269]. It fell into almost complete disuse in Britain in the 20th century as artificial fibres were increasingly used, but it is once again coming into prominence both as a fibre and as an oilseed crop(1995)[K]. Linseed is grown for its edible seed, the oil from the seed and for the fibres obtained from the stems[46]. There are many named varieties, though these usually fall within with two classes. One class, generally known as flax, does not branch much and is grown mainly for the fibre in its stem, whilst the other class, known as linseed, branches much more freely and is grown mainly for its seed. Although classified as a species, linseed is possibly an ancient cultigen derived in cultivation from *L. bienne*[17, 238]. Flax crops take 3 - 4 months to reach maturity, though autumn or early spring sown crops can take 6 - 7 months[269]. *Lolium specis* (Rye grasses) and *Phleum specis* (Timothy grass) have allelopathic effects on *Linum*, reducing its carbohydrate synthesis[269]. Linseed is a good companion plant for potatoes and carrots but is inhibited by *Camelina sativa*[18, 20].

5.2.109 Hemerocallis lilioasphodelus

Yellow Day Lily

4 tlin 8 cyuc 4 kcak 2 tcan 2 dwat 0.6 m hkuc
hmmimhtut cyutli kyuctcup hwicli hrasjlutnyikfril hpa7tli flatprikwli hpa7tmwatli fyfxre7t hjonli

drutta *Hemerocallis lilioasphodelus* is a PERENNIAL growing to 0.6 m (2ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcakta Edible Parts: Flowers Leaves Root Shoots Edible Uses: Leaves and young shoots - raw or cooked like asparagus or celery[85, 105, 183]. They must be consumed when very young or else they become fibrous[K]. Flower buds - raw or cooked. They taste somewhat like green beans[85, 105]. They contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Flowers - raw or cooked[85, K]. They can be dried and used as a thickener in soups etc[183]. If the flowers are picked just as they start to wither they can be used as a condiment[85]. The flowers are a traditional food in China where they are steamed and then dried[266]. Root - cooked[85, 105]. They taste like a blend of sweet corn and salsify[183]. We have found them to be tender but fairly bland with a slight sweetness[K]. The swollen roots are quite small and are only really worthwhile using if the plant is being dug up for divisions or some other reason[K].

tcanta Weaving The tough dried foliage is plaited into

cord and used for making footwear[205]. Plants form a spreading clump and are suitable for ground cover when spaced about 45cm apart each way[208]. The dead leaves should be left on the ground in the winter to ensure effective cover[208].

dwatta Antidote Cancer Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. The root also has a folk history of use in the treatment of cancer - extracts from the roots have shown antitumour activity[218]. A tea made from the boiled roots is used as a diuretic[205].

nrakta Original habitat is obscure, possibly China. An occasional garden escape in Britain. ksacta Rocky mountain woods, wet meadows and riversides on foothills of the S.E. Alps in Europe[50].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88, 111]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Plants are very cold-hardy, tolerating temperatures down to about -25°C[187]. A very vigorous plant, spreading by underground rhizomes[1]. The plant has a fibrous root system with occasional spindle-like swellings[205]. Cultivated as a food and medicinal plant in Japan[127]. Individual flowers are short-lived, they open at night and last for 20 - 76 hours. The plant produces a succession of blooms over a period of about 2 months[205]. The flowers are fragrant[205]. The flowers have a honeysuckle-like scent and this can pervade the air for a considerable distance when warmed by the summer sunshine[245]. Hybridizes freely with other members of this genus[200]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. The plant is heat tolerant in zones 12 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

5.2.110 Allium canadense

Canadian Garlic, Meadow garlic, Fraser meadow garlic, Hyacinth meadow garlic

4 tlin 8 cyuc 4 kcak 2 tcan 2 dwat 0.5 m hkuc
hmmimhtut cyutli tcuphja7n hwicli hrasjlut hpa7tli flatprikwli hpa7tmwatli xre7t hjonli

drutta *Allium canadense* is a BULB growing to 0.5 m (1ft 8in) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils.

It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Bulb - raw or cooked[46, 61, 62, 177]. It can be used as a vegetable, or as a flavouring in soups and stews, and can also be pickled[2]. The bulb is up to 30mm in diameter, it is crisp, mild and with a pleasant flavour[183]. Used as a leek substitute according to one report[22], it is a garlic substitute according to others[55, 159, K]. Leaves - raw or cooked[55, 62, 177]. A delicious mild flavour, they are available from early spring until the autumn[K]. They make a very acceptable salad and can also be used as a greens or as a flavouring in cooked foods[K]. Flowers - raw. A little bit stronger flavour than the leaves, especially as the seeds begin to form, they can be used as a flavouring and garnish on salads[K]. Some forms of this species produce bulbils. These top-setting bulbils make a fine onion flavoured pickle[62, 105, 183]. They are said to have a superior flavour to other pickled onions[2].

tcanta Repellent The juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20]. The plant can be rubbed on exposed parts of the body to protect them from insect bites and the bites of scorpions, lizards etc[257].

dwatta Antiasthmatic Carminative Cathartic Diuretic Expectorant Stimulant The plant is antiasthmatic, carminative, cathartic, diuretic, expectorant and stimulant[257]. A tincture is used to prevent worms and colic in children, and also as a remedy for croup[257]. Although no other specific mention of medicinal uses has been seen for this species, members of this genus are in general very healthy additions to the diet. They contain sulphur compounds (which give them their onion flavour) and when added to the diet on a regular basis they help reduce blood cholesterol levels, act as a tonic to the digestive system and also tonify the circulatory system[K].

nrakta N. America - New Brunswick to Minnesota, south to Florida and Colorado ksacta Sandy soils in low woods, thickets and meadows[43, 274].

propta Seed - sow spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle - if you want to produce clumps more quickly then put three plants in each pot. Grow them on in the greenhouse for at least their first winter and plant them out into their permanent positions in spring once they are growing vigorously and are large enough. Division in spring. Very easy, the plants divide successfully at any time in the growing season and the divisions can be planted straight out into their permanent positions if required. Bulbils planted in situ when ripe.

nwatta Prefers a sunny position in a light well-drained soil[1]. A moisture loving plant according to another report[42]. The bulbs should be planted fairly deeply[1]. Bulbs grow to a good size under cultivation[183]. Some forms of this species produce many bulbils and are considered to be a pernicious weed in some areas of America[159], there is some risk that they could spread aggressively in Britain[203]. A. canadense mobilense. (Reg.)F.M.Ownb. is a form that does not produce bulbils and is much better behaved[200]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

5.2.111 Rumex acetosella

Sheeps Sorrel, Common sheep sorrel
4 tlin 8 cyuc 4 kcak 1 tcan 3 dwat 0.3 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyik hpa 7tli frusflatprikli-
wis hpa 7tmwatli nyanhjen hjonli

dwatta Rumex acetosella is a PERENNIAL growing to 0.3 m (1ft) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to August, and the seeds ripen from July to September. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Wind. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

pcista Plants can contain quite high levels of oxalic acid, which is what gives the leaves of many members of this genus an acid-lemon flavour. Perfectly alright in small quantities, the leaves should not be eaten in large amounts since the oxalic acid can lock-up other nutrients in the food, especially calcium, thus causing mineral deficiencies. The oxalic acid content will be reduced if the plant is cooked. People with a tendency to rheumatism, arthritis, gout, kidney stones or hyperacidity should take especial caution if including this plant in their diet since it can aggravate their condition[238].

kcakta Edible Parts: Leaves Root Seed Edible Uses: Drink Leaves - raw or cooked[4, 12, 55, 62, 183]. A delicious lemon-like flavour, most people consider them too strong to use in quantity, but they are excellent as a flavouring in mixed salads[K]. The leaves should only be used in small quantities due to the oxalic acid content. The leaves can be used as thickeners in soups etc[102], they can also be dried for later use[12]. Root - cooked. It can be dried, ground into a powder and made into noodles[105]. Seed - raw or cooked[172]. Easy to harvest, but the seed is rather small and fiddly to use[K]. A drink similar to lemonade (but without the fizz) is made by boiling up the leaves[102].

tcanta Dye Dark green to brown and dark grey dyes can be obtained from the roots, they do not need a mordant[168]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Astringent Diuretic Poultrice Urinary Sheep's sorrel is a detoxifying herb, the fresh juice of the leaves having a pronounced diuretic effect[254]. Like other members of the genus, it is mildly laxative and holds out potential as a long term treatment for chronic disease, in particular that of the gastro-intestinal tract[254]. The plant is also part of a North American formula called essiac which is a popular treatment for cancer. Its effectiveness has never been reliably proven or disproven since controlled studies have not been carried out. The other herbs included in the formula are Arctium lappa, Ulmus rubra and Rheum palmatum[254]. The whole plant, used in the fresh state, is diaphoretic, diuretic and refrigerant[222]. A tea made from the leaves is used in the treatment of fevers, inflammation and scurvy[222]. The leaf juice is useful in the treatment of urinary and kidney diseases[4]. A leaf poultice is applied to tumours, cysts etc, and is a folk treatment for cancer[222]. A tea made from the roots is astringent and is used in the treatment of diarrhoea and excessive menstrual bleeding[222].

nrakta Central and southeastern Europe, including Britain, as far north as Scandinavia and Iceland. ksacta Heaths and acid grasslands[17]. A weed of acid soils[17, 55].

propta Seed - sow autumn or spring in situ. Division in spring.

nwatta Succeeds in most soils[37], preferring a moist moderately fertile well-drained soil in a sunny position[200]. Although a plant of acid soils, it can tolerate some alkalinity[17]. A good food plant for the caterpillars of many species of butterflies[24, 30], it grows well in the summer meadow[24]. Dioecious. Male and female plants must be grown if seed is required. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A clumping mat former. Forming a dense prostrate carpet spreading indefinitely [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

5.2.112 *Stachys affinis*

Chinese Artichoke, Artichoke betony
4 tlin 8 cyuc 4 kcaok 0 tcan 1 dwat 0.5 m hkuc
hmmihtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikrlwis
hpa7tmwatli xre7t hjonli

drutta *Stachys affinis* is a PERENNIAL growing to 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from May to November, in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Leaves Root Edible Uses: Tubers - raw or cooked[1, 2, 4, 16, 33]. Quite a pleasant mild flavour and easily digested[46], but fairly small and fiddly[K], they are about 5 - 8cm long and 2cm wide[200, 206]. A nutty artichoke-like flavour[183], it can be eaten raw on its own, be added to salads or be lightly cooked[K]. The tubers quickly discolour when exposed to the air[200] and are said to lose their flavour if they are peeled[183]. It is best to harvest them as required[206]. Yields are about 1kg per square metre[200]. Leaves - cooked. A famine food, they are only used when all else fails[179].

dwatta AnodyneThe dried and powdered root is anodyne[218]. The entire plant has been used in the treatment of colds and pneumonia[266].

nrakta E. Asia - China, Japan. ksacta Wet and submersed areas; 0-3200 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang[266]

propta Seed - sow spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle. If sufficient growth has been made, it is possible to plant them out during the summer, otherwise grow them on in pots for their first summer, leaving the tubers in the pots to overwinter in a cold frame and then plant out in late spring when in active growth. Seed is rarely if ever produced on plants growing in Britain. Division. The tubers can be harvested and replanted at any time whilst they are dormant. They do start into growth fairly early in the year so it is better to have moved them by the end of March[K].

nwatta Prefers a well-drained soil in a sunny position[16]. Thrives in an ordinary garden soil[1], preferring one that is not too heavy[16, 33]. It grows best in a soil that has been well fed and does not dry out in the growing season[16]. Plants seem to withstand even water-logged conditions in the winter[206]. The Chinese artichoke is occasionally cultivated for its edible tubers, they are planted out in March and harvested from October onwards[1, 58, 61]. Although top growth is killed back by frost, the tubers are very hardy and can be left in the ground over winter to be harvested as required[200]. It is virtually impossible to find all the tubers, there are always some left behind that will grow the following season[K]. Plants are very tolerant of high summer temperatures[206]. The tubers begin to sprout at temperatures above about 5°C[206]. Plants take 5 - 7 months to develop their tubers[206]. Plants rarely flower in Britain[1]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

5.2.113 *Allium senescens*

German Garlic
4 tlin 10 cyuc 4 kcaok 0 tcan 2 dwat 0.5 m hkuc
htut cyutli hqatkyuctcup hwicli hrasljut hpa7tli flatprikrlwis
hpa7tmwatli fyifxre7t hjonli

drutta *Allium senescens* is a BULB growing to 0.5 m (1ft 8in) by 0.2 m (0ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy)

and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in very large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Bulb - raw or cooked[2, 46, 61, 105]. An onion substitute[22, 177]. The small bulbs are formed in clusters on a rhizome and are up to 10mm in diameter[200]. Leaves - raw or cooked[105, 177]. A fairly strong onion flavour with a slight bitterness, but acceptable raw[K]. We use them in salads or as a flavouring in cooked foods[K]. Flowers - raw or cooked. An attractive garnish in salads[K].

tcanta RepellentThe juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20].

dwatta Although no specific mention of medicinal uses has been seen for this species, members of this genus are in general very healthy additions to the diet. They contain sulphur compounds (which give them their onion flavour) and when added to the diet on a regular basis they help reduce blood cholesterol levels, act as a tonic to the digestive system and also tonify the circulatory system[K].

nrakta C. Europe to Siberia, China and Korea. ksacta Dry, usually rocky places[50]. Forests, dry stony slopes, steppes, saline meadows and gravelly places at elevations of 500 - 800 metres in northern China[266].

propta Seed - sow spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle - if you want to produce clumps more quickly then put three plants in each pot. Grow them on in the greenhouse for at least their first winter and plant them out into their permanent positions in spring once they are growing vigorously and are large enough. Division in spring. Very easy, the plants divide successfully at any time in the growing season and the divisions can be planted straight out into their permanent positions if required.

nwatta Landscape Uses: Alpine garden, Border, Container, Massing, Rock garden, Specimen. Prefers a sunny position in a light well-drained soil[1]. Established plants are fairly drought tolerant[190]. A very ornamental plant[42], it is frequently confused with *A. montanum*[1]. The bulbs should be planted fairly deeply[1]. Most members of this genus are intolerant of competition from other growing plants[203]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. Special Features: Attractive foliage, Fragrant foliage, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers.

5.2.114 *Balsamorhiza hookeri*

Balsam Root, Hooker's balsamroot, Hairy balsamroot, Idaho balsamroot, Rabbithead balsamroot, Negle
4 tlin 8 cyuc 4 kcaok 0 tcan 1 dwat 0.3 m hkuc
htut cyutli kyuctcup hwicli hrasljut hpa7tli flatprikrlwis
hpa7tmwatli xre7t hjonli

drutta *Balsamorhiza hookeri* is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Root Seed Edible Uses: Root - raw or cooked[2, 46, 106, 183, 257]. A sweet and agreeable taste when cooked[61, 105]. Seed - raw or cooked[105, 161]. It can be ground into a powder and formed into cakes for eating raw or made into a bread[257].

dwatta Stomachic Women's complaintsA decoction of the root has been used for stomach problems, bladder com-

plants and female complaints[257]. The sub-species *B. hookeri hirsuta* has been specified for these uses[257].

nrakta Western and Central N. America ksacta Dry rock outcrops in foothills and lowlands[60].

propta Seed - sow early spring in a greenhouse and only just cover the seed. Germination usually takes place within 2 - 6 days at 18°C. Either sow the seed in individual pots or pot up the seedlings as soon as they are large enough to handle and plant them out into their permanent positions in the summer[134]. Division in spring. Very difficult since the plant strongly resents root disturbance[134]. It is probably best to take quite small divisions, or basal cuttings, without disturbing the main clump. Pot these up into individual pots and keep them in light shade in the greenhouse until they are growing away well. Plant them out in the summer if they have grown sufficiently, otherwise over-winter them in the greenhouse and plant out in late spring.

nwatta Requires a deep fertile well-drained loam in full sun[134, 200]. Plants strongly resent winter wet[134, 200]. Hardy to at least -25°C[200]. Plants are intolerant of root disturbance and should be planted into their permanent positions whilst still small[134].

5.2.115 *Beta vulgaris craca*

Beetroot

4 tlin 8 cyuc 4 kcak 0 tcan 2 dwat 0.9 m hkuc
htut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikhwissliph-som hpa7tmwatli xre7t hjonli

drutta *Beta vulgaris craca* is a BIENNIAL growing to 0.9 m (3ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Leaves Root Edible Uses: Root - raw or cooked[2, 16, 27, 132]. Well-grown roots are sweet and tender, especially when young, and can be grated and used in salads. Beetroots are traditionally boiled until tender then pickled in vinegar and used in salads. The roots can also be cooked and used as a vegetable, they are sweet and delicious when baked[K]. The root contains up to 8% sugar[143]. The root is tasteless when grown on very wet soils and dry when grown on clay soils[132]. Immature roots can be harvested in the summer and early autumn for immediate use, these are usually much more tender than the older roots[K]. Mature roots can be left in the ground all winter and harvested as required, though they might suffer damage in severe winters[K]. Alternatively, they are harvested in late autumn or early winter and will store for up to 6 months in a cool but not dry frost-free place[K]. Leaves - raw or cooked like spinach[183]. A reasonable spinach substitute, though harvesting leaves from growing plants can reduce yields of the roots[K]. Some people dislike the raw leaves since they can leave an unpleasant taste in the mouth[K]. A nutritional analysis is available[218].

dwatta Antitumor Carminative Emmenagogue Haemostatic Stomachic Tonic Although little used in modern herbalism, beet has a long history of folk use, especially in the treatment of tumours[269]. The root of white-rooted forms contain betaine which promotes the regeneration of liver cells and the metabolism of fat cells[254]. The root of red-rooted forms contains betanin - an anthocyanin similar to those found in red wine - which is partly responsible for red beet's immune-enhancing effect[254]. The root is carminative, haemostatic, stomachic and a tonic for women[218]. The root can be used as part of the diet, or the juice can be extracted and used as a health-promoting drink[254]. At least one litre of the juice from red-rooted forms must be taken each day in order to stimulate the immune system[254]. The juice is prescribed by herbalists as part of a cancer-treatment regime[254]. A decoction prepared from the seed has been used as a remedy for tumours of the intestines. The seed, boiled in water, is said to cure genital tumours[269]. The juice or other parts of the plant is said to help in the treatment of tumours, leukaemia and other forms of cancer such as cancer of the breast, oesophagus, glands, head, intestines, leg, lip, lung, prostate, rectum, spleen, stomach,

and uterus[269]. Some figure that betacyanin and betacyanin are important in the exchange of substances of cancer cells; others note two main components of the amines, choline and its oxidation product betaine, whose absence produces tumours in mice[269]. The juice has been applied to ulcers[269]. A decoction is used as a purgative by those who suffer from haemorrhoids in South Africa[269]. Leaves and roots used as an emmenagogue[269]. Plant effective in the treatment of feline ascariasis[269]. In the old days, beet juice was recommended as a remedy for anaemia and yellow jaundice, and, put into the nostrils to purge the head, clear ringing ears, and alleviate toothache[269]. Beet juice in vinegar was said to rid the scalp of dandruff as scurf, and was recommended to prevent falling hair[269].

nrakta A cultivated form of *B. vulgaris maritima* that is grown for its edible root. ksacta Not known in a truly wild situation.

propta Seed - pre-soaking for 12 hours in warm water prior to sowing encourages mare rapid and even germination[264]. For the earliest crop, ready to harvest in late spring, sow the seed in situ in late February or early March, giving it some protection such as a cloche. The first outdoor sowings can be made in March in situ to provide a crop from early summer onwards. For both of these sowings it is important to choose varieties that are resistant to bolting in case there is a cold spell in the spring. Sowings for the main crop can be made in April to early June to provide roots for autumn, winter and early spring use. Late sowings of fast-maturing varieties can be made in June and early July in order to provide fresh young roots in the autumn.

nwatta A very easily grown plant, it succeeds in sun or light shade in moist soils but prefers a rich well-drained light neutral to alkaline soil[33, 37]. Beets grow well in a variety of soils, growing best in a deep, friable well-drained soil abundant with organic matter, but doing poorly on clay. They prefer an open position and a light well-drained soil[52]. The optimum pH is 6.0 - 6.8, but neutral and alkaline soils are tolerated in some areas. Some salinity may be tolerated after the seedling stage. Beets are notable for their tolerance to manganese toxicity[269]. Beet is reported to tolerate an annual precipitation of 23 to 315cm, an average annual temperature range of 5.0 to 26.6°C and a pH of 4.2 to 8.2[269]. Plants are tolerant of saline soils and respond positively if salt is added to non-saline soils at a rate of about 30g per square metre[264]. Beetroot plants are generally hardy in Britain and can be left outdoors in the soil in most winters, though prolonged cold weather or severe winters can damage the roots. If the plants are exposed to prolonged temperatures below -10°C they will quickly run to seed[200]. This also applies to the young plants of most beetroot varieties if they are sown in early spring - a short period where temperatures fall below zero can fool the plant into believing that there has been a winter and it will then try to flower and produce seed. There are, however, some varieties, such as 'Bolthardy', that are more resistant to bolting and so more suited to these early sowings[200, 264]. The beetroot is widely cultivated, especially in temperate zones, for its edible root. There are two basic forms, those with rounded roots and those with elongated roots with many named varieties of each form. The roots can be available all year round from successional sowings. A fast-growing plant, some cultivars can produce a root ready for harvesting within 7 weeks from sowing the seed[264]. Most beetroot seed is actually a cluster of several seeds, though monogerm varieties have been produced that only have one seed - these monogerm varieties are less likely to require thinning once they have germinated[264]. A good companion for dwarf beans, onions and kohlrabi[18, 201]. Its growth is inhibited by runner beans, charlock and field mustard[18, 201].

5.2.116 *Beta vulgaris flavescens*

Swiss Chard

4 tlin 8 cyuc 4 kcak 2 tcan 2 dwat 0.9 m hkuc
htut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikhwissliph-som hpa7tmwatli xre7t hjonli

drutta *Beta vulgaris flavescens* is a BIENNIAL growing to 0.9 m (3ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy)

and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Leaves Stem Edible Uses: Leaves - raw or cooked like spinach[2, 16, 27, 33]. A very good spinach substitute, the leaves are large and easily harvested, yields are high[K]. Some people dislike the raw leaves since they can leave an unpleasant taste in the mouth[K]. Leaf stems - cooked. The steamed stems retain their crispness and have a delicious flavour, they are considered to be a gourmet vegetable[K]. Flowering stem - cooked. A broccoli substitute[16].

tcanta Companion Agroforestry Uses: Beet is said to be a good companion for dwarf beans, onions and kohlrabi[18], though the growth of spinach beet is inhibited by runner beans, charlock and field mustard[18].

dwatta Antitumor Emmenagogue Although little used in modern herbalism, beet has a long history of folk use, especially in the treatment of tumours[269]. A decoction prepared from the seed has been used as a remedy for tumours of the intestines. The seed, boiled in water, is said to cure genital tumours[269]. The juice or other parts of the plant is said to help in the treatment of tumours, leukaemia and other forms of cancer such as cancer of the breast, oesophagus, glands, head, intestines, leg, lip, lung, prostate, rectum, spleen, stomach, and uterus[269]. Some figure that betacyanin and anthocyanin are important in the exchange of substances of cancer cells; others note two main components of the amines, choline and its oxidation product betaine, whose absence produces tumours in mice[269]. The juice has been applied to ulcers[269]. A decoction is used as a purgative by those who suffer from haemorrhoids in South Africa[269]. Leaves and roots used as an emmenagogue[269]. Plant effective in the treatment of feline ascariasis[269]. In the old days, beet juice was recommended as a remedy for anaemia and yellow jaundice, and, put into the nostrils to purge the head, clear ringing ears, and alleviate toothache[269]. Beet juice in vinegar was said to rid the scalp of dandruff as scurf, and was recommended to prevent falling hair[269]. Juice of the white beet was said to clear obstructions of the liver and spleen[269]. Culpepper (1653) recommended it for treating headache and vertigo as well as all affections of the brain[269].

nrakta A cultivated form of *B. vulgaris maritima* that is grown for its leaves and petioles. ksacta Not known in a truly wild situation.

propta Seed - sow in situ in early April for the summer crop and again in early July to August for the winter and spring crop. It is also possible to obtain an earlier crop by sowing the seed in a tray in a greenhouse in March and planting out in April/May[264].

nwatta A very easily grown plant, it succeeds in sun or light shade in moist soils but prefers a rich well-drained light neutral to alkaline soil[33, 37]. Beets grow well in a variety of soils, growing best in a deep, friable well-drained soil abundant with organic matter, but doing poorly on clay. They prefer an open position and a light well-drained soil[52]. The optimum pH is 6.0 - 6.8, but neutral and alkaline soils are tolerated in some areas. Some salinity may be tolerated after the seedling stage. Beets are notable for their tolerance to manganese toxicity[269]. Beet is reported to tolerate an annual precipitation of 23 to 315cm, an average annual temperature range of 5.0 to 26.6°C and a pH of 4.2 to 8.2[269]. Plants are tolerant of saline soils and respond positively if salt is added to non-saline soils at a rate of about 30g per square metre[264]. Plants frequently self-sow if they are happy, sometimes too freely[K]. Swiss chard is sometimes cultivated by gardeners for its edible leaves and stems[16], it does not make a very good commercial crop since the leaves quickly droop after being harvested and therefore do not make the trip to market. The leaves are a good hot weather substitute for spinach[183] and can be available all year round if the winters are not too severe[K]. In severe winters it is possible to dig up some plants and move them to a protected area such as a greenhouse in order to produce fresh leaves[1]. A good companion for dwarf beans, onions and kohlrabi[18]. Its growth is inhibited by runner beans, charlock and field mustard[18].

5.2.117 Vaccinium praestans

Kamchatka Bilberry

4 tlin 8 cyuc 4 kcak 4 tcan 0 dwat 0.2 m hkuc hmimhtut cyutli tcup hwicli hrasljut hpa7tli frusflat hpa7tmwatli xre7t hjonli

drutta *Vaccinium praestans* is a deciduous Shrub growing to 0.2 m (0ft 8in) by 0.3 m (1ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in June. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[1, 105]. The taste is sweet and fragrant, somewhat like a strawberry[11]. A delicious flavour[183]. The fruit is about 12mm in diameter[200].

tcanta A good ground cover for cool moist shady areas[182].

nrakta Northern N. America to N.E. Asia. ksacta Mossy bogs, swampy woods (often on rotting fallen tree trunks), elevated places and slopes in northern Asia[74].

propta Seed - sow late winter in a greenhouse in a lime-free potting mix and only just cover the seed[78]. Stored seed might require a period of up to 3 months cold stratification[113]. Another report says that it is best to sow the seed in a greenhouse as soon as it is ripe[200]. Once they are about 3cm tall, prick the seedlings out into individual pots and grow them on in a lightly shaded position in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 5 - 8cm with a heel, August in a frame[78]. Slow and difficult. Layering in late summer or early autumn[78]. Another report says that spring is the best time to layer[200]. Takes 18 months[78]. Division of suckers in spring or early autumn[113]. Larger divisions can be planted out direct into their permanent positions, but we have found that in general it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame until they are growing away well. Plant them out in the summer or the following spring.

nwatta Requires a moist but freely-draining lime free soil, preferring one that is rich in peat or a light loamy soil with added leaf-mould[11, 200]. Prefers a very acid soil with a pH in the range of 4.5 to 6, plants soon become chlorotic when lime is present. Succeeds in full sun or light shade though it fruits better in a sunny position[200]. Requires shelter from strong winds[200]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. In this country, plants grow better in northern England and Scotland, in southern England they need a position with plenty of light but little direct sun[11]. Plants in this genus are notably resistant to honey fungus[200].

5.2.118 Mentha x villosa alopecuroides

Apple Mint, Bowles' Mint

4 tlin 8 cyuc 4 kcak 3 tcan 2 dwat 0.6 m hkuc hmimhtut cyutli tcup hwicli hrasljutnykfrp hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta *Mentha x villosa alopecuroides* is a PERENNIAL growing to 0.6 m (2ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no records of toxicity have been seen for this species, large quantities of some members of this genus, especially when taken in the form of the extracted essential oil, can cause abortions so some caution is advised.

kcakta Edible Parts: Leaves Edible Uses: Condiment Tea Leaves - raw or cooked[14]. A strong spearmint flavour, they are used as a flavouring in salads or cooked foods[183],

this is also the main species that is used to make mint sauce. A herb tea is made from the fresh or dried leaves[21, 183].

tcanta Essential Repellent StrewingAn essential oil is obtained from the whole plant. The plant repels insects and was formerly used as a strewing herb[14, 18, 20]. Rats and mice intensely dislike the smell of mint. The plant was therefore used in homes as a strewing herb and has also been spread in granaries to keep the rodents off the grain[244].

dwatta Antiseptic Carminative FebrifugeApple mint, like many other members of this genus, is often used as a domestic herbal remedy, being valued especially for its antiseptic properties and its beneficial effect on the digestion. Like other members of the genus, it is best not used by pregnant women because large doses can cause an abortion. A tea made from the leaves of most mint species has traditionally been used in the treatment of fevers, headaches, digestive disorders and various minor ailments[222]. The leaves are harvested as the plant comes into flower and can be dried for later use[238]. The essential oil in the leaves is antiseptic, though it is toxic in large doses[222].

nrakta Central and southern Europe, including Britain, Mediterranean region, Azores. **ksacta Roadsides and in ditches in the S. and W. of England**[5, 17]. Probably a hybrid, *M. spicata* x *M. suaveolens*.

propta Seed - sow spring in a cold frame. Germination is usually fairly quick. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. *Mentha* species are very prone to hybridisation and so the seed cannot be relied on to breed true. Even without hybridisation, seedlings will not be uniform and so the content of medicinal oils etc will vary. When growing plants with a particular aroma it is best to propagate them by division[K]. Division can be easily carried out at almost any time of the year, though it is probably best done in the spring or autumn to allow the plant to establish more quickly. Virtually any part of the root is capable of growing into a new plant. Larger divisions can be planted out direct into their permanent positions. However, for maximum increase it is possible to divide the roots up into sections no more than 3cm long and pot these up in light shade in a cold frame. They will quickly become established and can be planted out in the summer.

nwatta A very easily grown plant, it succeeds in most soils and situations so long as the soil is not too dry[1, 200]. Grows well in heavy clay soils. Prefers a slightly acid soil[16]. A sunny position is best for the production of essential oils, but the plant also succeeds in partial shade. Apple mint is commonly grown in the herb garden. There is at least one named variety, 'Bowles mint' is said to be a superior form and it is the form usually cultivated commercially for mint sauce. Unlike most members of the genus, this species is resistant to the disease 'rust'[238]. Most mints have fairly aggressive spreading roots and, unless you have the space to let them roam, they need to be restrained by some means such as planting them in containers that are buried in the soil[K]. Hybridizes freely with other members of this genus. The whole plant has a strong aroma of spearmint. The flowers are very attractive to bees and butterflies[24]. A good companion for growing near cabbages and tomatoes, helping to keep them free of insect pests[14, 20]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

5.2.119 *Origanum vulgare*

Origanum, Pot Marjoram

4 tlin 10 cyuc 4 kcak 5 tcant 3 dwat 0.6 m hkuc

hmmihtut cyutli kyuctup hwicli hyishrasjlutnyik hpa7tli flat-prikliw hpa7tmwatli xre7t hjonli

drutta *Origanum vulgare* is a PERENNIAL growing to 0.6 m (2ft) by 0.8 m (2ft 7in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is hermaphrodite

(has both male and female organs) and is pollinated by Bees, Lepidoptera (Moths and Butterflies). It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Flowers Leaves Stem **Edible Uses:** **Condiment Tea**Leaves - raw or cooked as a potherb[5, 52, 183]. **Origano** is an important flavouring herb in Mediterranean cookery, and is often used dried rather than fresh[238]. The leaves are used as a flavouring for salad dressings, vegetables and legumes, and are frequently included in strongly flavoured dishes with chillies, garlic, onions etc[2, 13, 21, 27, 183, 238]. A nutritional analysis is available[218]. Flowers, usually appear in late spring, are edible. Much of the commercially available dried origano does not come from this plant but from a number of different, often unrelated plants[238]. These include *Lippia graveolens*, *L. palmeri* and *Origanum syriacum*[238]. A herb tea is made from the dried leaves and flowering stems[183, 207, 238].

tcanta Dye Essential Parasiticide Repellent StrewingAn essential oil from the plant is used as a food flavouring, in soaps and perfumery[115, 171]. The herb contains 0.15 - 0.4% essential oil[218] and makes good herbal pillows and baths[244]. The plant was formerly used as a strewing herb[201]. The essential oil has also been used to kill lice, though some caution is advised since it can cause skin irritations[238]. A red or purple dye is obtained from the flowering tops[4, 7, 13, 100], it is neither brilliant nor durable[115]. The plant repels ants[46]. The growing plant repels many insect pests so it is a good plant to grow in the vegetable area[201]. A useful ground cover for sunny positions, forming a slowly spreading clump[197, K]. Plants should be spaced about 30cm apart each way[208].

dwatta Antirheumatic Antiseptic Antispasmodic Aromatherapy Carminative Cholagogue Diaphoretic Emmenagogue Expectorant Odontalgic Parasiticide Stimulant Stomachic TonicOriganum has been used as a culinary and medicinal herb for thousands of years. It has a beneficial effect upon the digestive and respiratory systems and is also used to promote menstruation[254]. It should not be used medicinally by pregnant women though it is perfectly safe in small amounts for culinary purposes[254]. The leaves and flowering stems are strongly antiseptic, antispasmodic, carminative, cholagogue, diaphoretic, emmenagogue, expectorant, stimulant, stomachic and mildly tonic[4, 7, 9, 21, 254]. The plant is taken internally in the treatment of colds, influenza, mild feverish illnesses, indigestion, stomach upsets and painful menstruation[238]. It is strongly sedative and should not be taken in large doses, though mild teas have a soothing effect and aid restful sleep[244]. It should not be prescribed for pregnant women[238]. Externally, origano is used to treat bronchitis, asthma, arthritis and muscular pain[238]. The plant can be used fresh or dried - harvest the whole plant (but not the roots) in late summer to dry and store for winter use[244]. Origanum is often used in the form of an essential oil that is distilled from the flowering plant[4]. A few drops of the essential oil, put on cotton wool and placed in the hollow of an aching tooth, frequently relieves the pain of toothache[4, 207]. This plant is one of the best natural antiseptics because of its high thymol content[7]. The essential oil is used in aromatherapy to treat the same kinds of complaints that the herb is used for[238].

nrakta Most of Europe, including Britain, to north and west Asia. **ksacta** Dry grassy areas and scrub, usually on calcareous soils[9, 17].

propta Seed - sow early spring at 10 - 13°C and only just cover the seed. Germination usually takes place within 2 weeks. Prick out the seedlings into individual pots when they are large enough to handle and plant them out into their permanent positions in early summer. The seed can also be sown in situ in late spring. Division in March or October. Very easy, larger divisions can be planted out direct into their permanent positions. We have found that it is better to pot up the smaller divisions and grow them on in light shade in a cold frame until they are well established before planting them out in late spring or early summer. Basal cuttings of young barren shoots in June. Very easy. Harvest the shoots with plenty of underground stem when they are about 8 -

10cm above the ground. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer.

nwatta Landscape Uses:Border, Container, Ground cover, Rock garden, Seashore. Requires a rather dry, warm, well-drained soil in full sun, but is not fussy as to soil type, thriving on chalk[1, 27]. Prefers slightly alkaline conditions[200]. Tolerates poor soils[24]. Dislikes wet soils[37]. Hardy to about -20°C[187]. Oregano has a long history of culinary and medicinal use and is often cultivated in modern gardens as a culinary herb, there are some named varieties[183, 187, 238, 244]. Plants growing near the sea have the most fragrance[7]. A good companion plant, improving the flavour of nearby plants[201]. The flowers are very attractive to bees and butterflies[5, 30]. A good companion for the cucumber family[14], it is beneficial to all nearby plants[20]. The whole plant has a sweet yet slightly peppery aroma[245]. Members of this genus are rarely if ever troubled by browsing deer[233]. Special Features: Attractive foliage, Fragrant foliage, Not North American native, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers, Fragrant flowers. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [2-1].

5.2.120 *Aralia nudicaulis*

Wild Sarsaparilla

4 tlin 8 cyuc 4 kcak 3 tcan 3 dwat 0.4 m hkuc
pcimhmim cyutli tcup hwicli hyishrasjltunyk hpa7tli flat-prikrlwis hpa7tmwatli xre7t hjonli

drutta *Aralia nudicaulis* is a PERENNIAL growing to 0.4 m (1ft 4in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in June, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: Fruit Leaves Root Shoots Edible Uses: Condiment Tea The rootstock is used as a flavouring[102], it is a substitute for sarsaparilla[43] and is also used for making 'root beer'[183]. It is also used as an emergency food[177] (usually mixed with oil[257]), having a sweet spicy taste and a pleasant aromatic smell[4]. A nutritious food[207], it was used by the Indians during wars or when they were hunting since it is very sustaining[213]. Young shoots - cooked as a potherb[207]. A refreshing herbal tea is made from the root[183]. Pleasantly flavoured[222, 238]. The roots are boiled in water until the water is reddish-brown[256]. A jelly is made from the fruit[207]. The fruit is also used to make wine[257]. The fruit is about 6mm in diameter[200]. The fruit is a round, purplish-black berry.

tcanta Groundcover. Wildlife - food source. A specialist nectary plant [1-2].

dwatta Alternative Diaphoretic Diuretic Eczema Homeopathy Pectoral Stimulant Wild sarsaparilla is a sweet pungent tonic herb that acts as an alternative. It had a wide range of traditional uses amongst the North American Indians and was at one time widely used as a substitute for the tropical medicinal herb sarsaparilla[222, 257]. The root is alternative, diaphoretic, diuretic, pectoral and stimulant[4, 21, 213, 222]. The herb encourages sweating, is stimulating and detoxifying and so is used internally in the treatment of pulmonary diseases, asthma, rheumatism, stomach aches etc[4, 213, 238, 254, 257]. Externally it is used as a poultice in treating rheumatism, sores, burns, itchy skin, ulcers and skin problems such as eczema[4, 222, 254]. The root is collected in late summer and the autumn and dried for later use[4, 213]. A drink made from the pulverised roots is used as a cough treatment[213]. A poultice made from the roots and/or the fruit is applied to sores, burns, itchy skin, ulcers, swellings etc[213, 222]. A homeopathic remedy made from the roots is important in the treatment of cystitis[238].

nrakta N. America - Newfoundland to Manitoba, south to N. Carolina and Missouri. ksakta Moist, shady, rocky

woods[4, 21].

propta Seed - best sown as soon as ripe in a cold frame. Stored seed requires 3 - 5 months of cold stratification. Germination usually takes place within 1 - 4 months at 20°C[134]. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in a greenhouse for at least their first winter. Once the plants are 25cm or more tall, they can be planted out into their permanent positions, late spring or early summer being the best time to do this. Root cuttings 8cm long, December in a cold frame[11, 78]. Store the roots upside down in sand and pot up in March/April. High percentage[78]. Division of suckers in late winter[11]. Very easy, the suckers can be planted out direct into their permanent positions if required.

nwatta Prefers a good deep loam and a semi-shady position[1, 134]. Requires a sheltered position[1]. Plants are hardier when grown in poorer soils[200]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

5.2.121 *Chenopodium bonus*

Good King Henry

4 tlin 8 cyuc 4 kcak 1 tcan 2 dwat 0.3 m hkuc
htut cyutli tcup hwicli hrasjltunyk hpa7tli flatprikrlwis hpa7tmwatli xre7t hjonli

drutta *Chenopodium bonus-henicricus* is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to July, and the seeds ripen from June to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista The leaves and seeds of all members of this genus are more or less edible. However, many of the species in this genus contain saponins, though usually in quantities too small to do any harm. Although toxic, saponins are poorly absorbed by the body and most pass straight through without any problem. They are also broken down to a large extent in the cooking process. Saponins are found in many foods, such as some beans. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K]. The plants also contain some oxalic acid, which in large quantities can lock up some of the nutrients in the food. However, even considering this, they are very nutritious vegetables in reasonable quantities. Cooking the plants will reduce their content of oxalic acid. People with a tendency to rheumatism, arthritis, gout, kidney stones or hyperacidity should take especial caution if including this plant in their diet since it can aggravate their condition[238].

kcakta Edible Parts: Flowers Leaves Seed Edible Uses: Young leaves - raw or cooked[2, 5, 7, 9, 12, 33]. The leaves wilt quickly after picking and so they need to be used as soon after harvesting as possible[264]. They can be used as a potherb[4]. The leaves are best in spring and early summer, the older leaves become tough and bitter[200]. The raw leaves should only be eaten in small quantities, see the notes above on toxicity. Young leaves can be chopped and used as a small part of mixed salads, though we are not enamoured by their flavour[K]. The cooked leaves make an acceptable spinach substitute, but are best mixed with nicer leaves[K]. The leaves are a good source of iron[244]. Young flowering shoots - cooked[2, 27, 132, 264]. When grown on good soil, the shoots can be as thick as a pencil[4]. When about 12cm long, they are cut just under the ground, peeled and used like asparagus[183]. A very pleasant spring vegetable[K]. The plant is sometimes blanched by excluding the light in order to produce a longer and more succulent shoot, though this practice also reduces the quantity of vitamins in the shoots[264, K]. Young flower buds - cooked[33, 183]. Considered to be

gourmet food[183], though they are rather small and harvesting any quantity takes quite a while[K]. Seed - ground and mixed with flour then used in making bread etc. The seed is small and fiddly but is easily harvested[K]. It should be soaked in water overnight and thoroughly rinsed before it is used in order to remove any saponins[K].

caanta DyeGold/green dyes can be obtained from the whole plant[168].

dwatta Emollient Laxative VermifugeThe herb is emollient, laxative and vermifuge[7, 154]. This remedy should not be used by people suffering from kidney complaints or rheumatism[7]. A poultice of the leaves has been used to cleanse and heal chronic sores, boils and abscesses[4, 7]. The seed is a gentle laxative that is suitable for children[7].

nrakta Most of Europe, including Britain, north to Scandinavia, W. Asia, N. America. ksacta Rich pastures, farmyards, roadsides etc[17].

propta Seed - sow spring in a cold frame. Germination can be slow, but usually a high percentage will germinate[K]. These seeds germinate best at 20C. Cold stratification of up to 9 weeks at 4C prior to exposure at 20C will increase the germination rate. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant out into their permanent positions in the summer. Division in spring[200]. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the summer or following spring.

nwatta Historic Grain Crop Management: Standard Staple Crop: Balanced carbPrefers a fertile humus rich soil in a sunny position[9, 16, 200]. The plant produces a better quality harvest in the summer if it is grown in light shade[264, K]. A very easily grown plant, it tolerates considerable neglect and succeeds in most soils and situations[16, 33, K]. Good King Henry was at one time frequently cultivated in the garden as a perennial vegetable, but it has fallen out of favour and is seldom grown at present[4, 46]. About thirty plants can produce a good supply of food for four people[264]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.2.122 Balsamorhiza deltoidea

Deltoid Balsamroot

4 tlin 8 cyuc 4 kcaak 0 tcan 1 dwat 0.6 m hkuc
htut cyuti kyucup hwicli hrasjlut hpa7tli flatprikhlwis
hpa7tmwatli xre7t hjonli

drutta Balsamorhiza deltoidea is a PERENNIAL growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Leaves Root Seed ShootsEdible Uses: CoffeeRoot - raw or cooked[22, 46, 61, 105, 106]. A sweet taste when cooked[161]. Young shoots - raw[46, 105, 161]. Seed - raw or cooked. It can be ground into a powder and made into a bread[46, 105, 161]. The ground seeds can be formed into cakes and eaten raw[257]. The roasted root is a coffee substitute[177].

dwatta MiscellanyA decoction of the split roots has been used in the treatment of coughs and colds[257].

nrakta Western N. America - British Columbia to California. ksacta Open places but not on thin soils[60].

propta Seed - sow early spring in a greenhouse and only just cover the seed. Germination usually takes place within 2 - 6 days at 18°C. Either sow the seed in individual pots or pot up the seedlings as soon as they are large enough to handle and plant them out into their permanent positions in the summer[134]. Division in spring. Very difficult since the plant strongly resents root disturbance[134]. It is probably best to take quite small divisions, or basal cuttings, without disturbing the main clump. Pot these up into individual pots and keep them in light shade in the greenhouse until they

are growing away well. Plant them out in the summer if they have grown sufficiently, otherwise over-winter them in the greenhouse and plant out in late spring.

nwatta Requires a deep fertile well-drained loam in full sun[134, 200]. Plants strongly resent winter wet[134, 200]. Hardy to at least -25°C[200]. Plants are intolerant of root disturbance and should be planted into their permanent positions whilst still small[134].

5.2.123 Malva neglecta

Dwarf Mallow, Common mallow

4 tlin 8 cyuc 4 kcaak 0 tcan 2 dwat 0.6 m hkuc
hmimhtut cyuti kyucup hwicli hrasjlutnyik hpa7tli flatprikhlwis hpa7tmwatli fyifxre7t hjonli

drutta Malva neglecta is a ANNUAL growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to September, and the seeds ripen from July to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista When grown on nitrogen rich soils (and particularly when these are inorganic), the plant tends to concentrate high levels of nitrates in its leaves[76]. The leaves are perfectly wholesome at all other times.

kcakta Edible Parts: Leaves SeedEdible Uses: Egg TeaLeaves and young shoots - raw or cooked[2, 9, 13, 74, 85]. A mild pleasant flavour[K], they are said to be highly nutritious[222]. They can be added in quantity to salads, and make an excellent lettuce substitute, they can also be cooked as greens[183, K]. The leaves are mucilaginous, when cooked in soups etc they tend to thicken it in much the same way as okra (Abelmoschatus esculenta)[222]. Some people find this mucilaginous texture unpleasant, especially if the leaves are cooked[K]. Immature seeds - raw or cooked[74, 85, 183]. A pleasant nutty flavour, they are nice as a nibble but too small for most people to want to collect in quantity[K]. A decoction of the roots is used as an egg-white substitute for making meringue[183]. The roots are brought to the boil in water and then simmered until the water becomes quite thick. This liquid can then be whisked in much the same way as egg whites[K]. A tea can be made from the dried leaves[85, 183].

caanta Dye TeethCream, yellow and green dyes can be obtained from the plant and the seed heads[168]. The root is used as a toothbrush[74].

dwatta Antiinflammatory Antiphlogistic Astringent Demulcent Diuretic Emollient Expectorant Laxative Poultice Purgative Salve UrinaryAll parts of the plant are antiphlogistic, astringent, demulcent, diuretic, emollient, expectorant, laxative, salve[9, 222, 238]. The leaves and flowers can be eaten as part of the diet, or a tea can be made from the leaves, flowers or roots[222]. The leaves and flowers are the main part used, their demulcent properties making them valuable as a poultice for bruise, inflammations, insect bites etc, or taken internally in the treatment of respiratory system diseases or inflammation of the digestive or urinary systems[222, 238]. They have similar properties, but are considered to be inferior to the marsh mallow (Althaea officinalis), though they are stronger acting than the common mallow (M. sylvestris). They are seldom used internally[4]. The plant is an excellent laxative for young children[7].

nrakta Most of Europe, including Britain, south and east to N. Africa and Asia. ksacta Waste and cultivated ground[17], usually on dry soils, frequently in coastal habitats, on dry walls or as a weed of cultivated ground[200].

propta Seed - sow early spring or autumn in situ. Germination should take place within 2 weeks. The seed germinates in the autumn in the wild.

nwatta A very easily grown plant, succeeding in ordinary garden soil, though it prefers a reasonably well-drained and moderately fertile soil in a sunny position. It also succeeds in dry soils. At one time this plant was often cultivated for its edible leaves[2]. Plants seem to be immune to the predations of rabbits[233]. Prone to infestation by rust fungus.

5.2.124 *Dichelostemma pulchellum*

Wild Hyacinth

4 tlin 8 cyuc 4 kcaak 0 tcan 0 dwat 0.6 m hkuc
htut cytuli kyuctup hwicli hrasjlut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Dichelostemma pulchellum* is a CORM growing to 0.6 m (2ft) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from May to June, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

ksakta Edible Parts: Flowers RootEdible Uses: Corm - raw or cooked[22, 61, 161, 183]. A sweet flavour[46], it may seem rather flat at first, but the taste quickly grows on one[95]. A slow baking develops the sweetness of the corm[95]. The corm can be dried and ground into a powder then used as a thickener in soups or mixed with cereal flours to make bread etc[257]. The corm is usually harvested in the spring[257]. The flowers - raw[257]. A nice decoration in the salad bowl[183].

tcanta AdhesiveThe corms have been rubbed on metate into an adhesive and then spread on baskets to close the interstices and prevent small seeds falling through the gaps[257].

nrakta South-western N. America - California. ksakta Plains and hillsides[71] on dry open ridges and grassy meadows to 1800 metres[42].

propta Seed - best sown as soon as it is ripe in a free-draining compost in a cold frame[200]. Sow stored seed in spring in a cold frame[175]. Seedlings are prone to damping off and so should be kept well ventilated[175]. Germinates in 1 - 3 months at 15°C[175]. If the seed is sown thinly enough, it can be grown on for its first year without transplanting and then the dormant bulbs can be planted 2/3 to a pot. Otherwise prick out the seedlings when large enough to handle, planting them 2/3 to a pot. Grow on the plants in a greenhouse for at least two years before planting out in late spring after the last expected frosts. Division in autumn of offsets that have reached flowering size[1]. Dig up the clumps of bulbs and replant the larger ones into their permanent positions. It is best to pot up the smaller ones and grow them on for a year in a cold frame before planting them out.

nwatta Easily grown in a well-drained rich sandy loam[1], it likes plenty of moisture whilst in growth followed by a warm dry period in late summer to autumn in order to fully ripen its bulb[200]. Plants are susceptible to rot in wet soils[200]. This species is hardy to between -5 to -10°C, it may require protection in severe winters[90]. This can be done by applying a good organic mulch such as dry bracken in late autumn and removing it in early spring. Alternatively, you can cover the ground with a cloche or other device. A very ornamental plant, it can flower in 2 years from seed.

5.2.125 *Valerianella locusta*

Corn Salad, Lewiston cornsalad

4 tlin 8 cyuc 4 kcaak 0 tcan 0 dwat 0.3 m hkuc
htut cytuli kyuctup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli fyifxre7t hjonli

drutta *Valerianella locusta* is an ANNUAL growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to June, and the seeds ripen from May to July. The species is hermaphrodite (has both male and female organs). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

ksakta Edible Parts: Flowers LeavesEdible Uses: Young leaves - raw[1, 2, 4, 5, 12, 27, 33, 37]. A very mild flavour, with a delicate quality that makes them seem to melt in the mouth, they can be added in quantity to salads[183]. The leaves can be available all year round from successional sowings and will only require protection in the colder winters[K]. Flowers and flowering stems - raw[183].

nrakta Europe, including Britain, from Scandinavia south and east to N. Africa and W. Asia. ksakta Cultivated

ground, waste places, hedgebanks, dunes etc, usually on dry soils[9, 17].

propta Seed - in order to obtain a continuous supply of salad leaves, it is best to sow the seed successionally from early spring to late summer in situ. A late summer sowing might also succeed, and this would supply edible leaves in the winter.

nwatta A very easily grown plant, it prefers a fairly rich light soil[1, 37] though it tolerates most soils and wet or dry conditions[52]. Prefers a sunny position but tolerates some shade in summer[K]. This shade, plus an adequate supply of water, will slow down the plant's tendency to run to seed[200]. Late sowings will benefit from a sheltered sunny position and perhaps some protection in the winter. Often cultivated on a garden scale for its edible young leaves which, by successional sowing, can be available for most of the year although they will require protection in severe winters. There are several named varieties[183]. The plants do tend to run quickly to seed in the summer though. If allowed to flower, plants will often maintain themselves by self-sowing[K].

5.2.126 *Triteleia grandiflora*

Wild Hyacinth, Largeflower triteleia, Howell's triteleia

4 tlin 8 cyuc 4 kcaak 0 tcan 0 dwat 0.7 m hkuc
htut cytuli kyuctup hwicli hrasjlut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Triteleia grandiflora* is a BULB growing to 0.7 m (2ft 4in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

ksakta Edible Parts: RootEdible Uses: Bulb - raw or cooked[207, 257]. A sweet nut-like flavour[212], they can be used like potatoes. Said by some people to be the tastiest of the North American edible bulbs[207]. At their best when slow roasted for an hour when they become rather sweet[183]. Young seedpods - cooked as a potherb[183, 207]. An excellent green[212].

nrakta Western N. America - British Columbia and south to Oregon and Utah. ksakta Dry to moist soils, often in rocky areas, meadows, or open woods of valleys, hills and in mountains to about 2700 metres[212].

propta Seed - best sown as soon as it is ripe in a cold frame. Alternatively, the seed can be sown in spring in a cold frame. Germination usually takes place within 1 - 3 months at 15°C. Sow the seed thinly so that there is no need to prick them out and grow the seedlings on in the pot for their first year. Give an occasional liquid feed to ensure that they do not become mineral deficient. Seedlings are prone to damping off so be careful not to overwater them and keep them well ventilated. When they become dormant, pot up the small bulbs placing about 3 in each pot. Grow them on in the greenhouse for another year or two until the bulbs are about 20mm in diameter and then plant them out into their permanent positions when they are dormant in the autumn. Division of flowering size bulbs in autumn. Dig up the clumps of bulbs, replanting the larger ones direct into their permanent positions. It is best to pot up the smaller ones and grow them on in a greenhouse for a year before planting them out when they are dormant in early autumn.

nwatta Requires a rich well-drained sandy loam[1]. Likes plenty of moisture whilst in growth followed by a warm dry period in late summer and autumn[200]. Succeeds outdoors in a very sheltered warm position. Plants grow in patches in the wild and these can cover considerable areas[212]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is a corm swelling at the stem base [1-2].

5.2.127 Beta vulgaris cicla

Spinach Beet

4 tlin 8 cyuc 4 kcaak 0 tcan 2 dwat 0.9 m hkuc
htut cyutli tcup hwicli hrasjlutnyk hpa7tli flatpriklwissliph-
som hpa7tmwatli xre7t hjonli

drutta Beta vulgaris cicla is a BIENNIAL growing to 0.9 m (3ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It cannot grow in the shade. It prefers moist soil.

ksakta Edible Parts: Leaves StemEdible Uses: Leaves and leaf stems - raw or cooked like spinach[2, 16, 27, 33]. A very good spinach substitute, the leaves are large and easily harvested, yields are high[K]. Some people dislike the raw leaves since they can leave an unpleasant taste in the mouth[K]. Flowering stem - cooked. A broccoli substitute[K].

dwatta Although little used in modern herbalism, beet has a long history of folk use, especially in the treatment of tumours[269]. A decoction prepared from the seed has been used as a remedy for tumours of the intestines. The seed, boiled in water, is said to cure genital tumours[269]. The juice or other parts of the plant is said to help in the treatment of tumours, leukaemia and other forms of cancer such as cancer of the breast, oesophagus, glands, head, intestines, leg, lip, lung, prostate, rectum, spleen, stomach, and uterus[269]. Some figure that betacyanin and anthocyanin are important in the exchange of substances of cancer cells; others note two main components of the amines, choline and its oxidation product betaine, whose absence produces tumours in mice[269]. The juice has been applied to ulcers[269]. A decoction is used as a purgative by those who suffer from haemorrhoids in South Africa[269]. Leaves and roots used as an emmenagogue[269]. Plant effective in the treatment of feline ascariasis[269]. In the old days, beet juice was recommended as a remedy for anaemia and yellow jaundice, and, put into the nostrils to purge the head, clear ringing ears, and alleviate toothache[269]. Beet juice in vinegar was said to rid the scalp of dandruff as scurf, and was recommended to prevent falling hair[269]. Juice of the white beet was said to clear obstructions of the liver and spleen[269]. Culpepper (1653) recommended it for treating headache and vertigo as well as all affections of the brain[269].

nrakta A cultivated form of *B. vulgaris maritima* that is grown for its edible leaves. ksakta Not known in a truly wild situation.

propta Seed - sow in situ in early April for the summer crop and again in early July to August for the winter and spring crop. It is also possible to obtain an earlier crop by sowing the seed in a tray in a greenhouse in March and planting out in April/May[264].

nwatta A very easily grown plant, it succeeds in sun or light shade in moist soils but prefers a rich well-drained light neutral to alkaline soil[33, 37]. Beets grow well in a variety of soils, growing best in a deep, friable well-drained soil abundant with organic matter, but doing poorly on clay. They prefer an open position and a light well-drained soil[52]. The optimum pH is 6.0 - 6.8, but neutral and alkaline soils are tolerated in some areas. Some salinity may be tolerated after the seedling stage. Beets are notable for their tolerance to manganese toxicity[269]. Beet is reported to tolerate an annual precipitation of 23 to 315cm, an average annual temperature range of 5.0 to 26.6°C and a pH of 4.2 to 8.2[269]. Plants are tolerant of saline soils and respond positively if salt is added to non-saline soils at a rate of about 30g per square metre[264]. Spinach beet is often cultivated by gardeners for its edible leaves[16], it does not make a very good commercial crop since the leaves quickly droop after being harvested and so do not stand the journey to market. This plant is a good hot weather substitute for spinach[183]. The leaves are available all year round from successional sowings if the winters are not too severe[K]. In severe winters it is possible to dig up some plants and move them to a protected area such as a greenhouse in order to produce fresh leaves[1]. Plants usually self-sow freely if they are well-sited and the ground is disturbed by hoeing etc[K]. A good companion for dwarf beans, onions and kohlrabi[18], though the

growth of spinach beet is inhibited by runner beans, charlock and field mustard[18].

5.2.128 Fritillaria camschatcensis

Kamchatka Lily, Kamchatka fritillary

4 tlin 8 cyuc 4 kcaak 0 tcan 0 dwat 0.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli flatpriklwishsom
hpa7tmwatli xre7t hjonli

drutta *Fritillaria camschatcensis* is a BULB growing to 0.5 m (1ft 8in) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Flies. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in saline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Root SeedpodEdible Uses: Bulb - raw, cooked or dried for later use[2, 46, 105, 183]. A staple food in areas where it grows wild[177], when cooked it tastes like baked chestnuts[74]. One report says that the bulbs have a slightly bitter taste, even after cooking[256]. The best-tasting bulbs are said to come from coastal areas where the plants are occasionally covered with salt water[254]. A pudding is made by mixing the bulbs with the fruit of *Empetrum nigrum*[183]. The bulb is also dried and ground into a powder, then used as a flour or starch for making breads and soups[183]. The bulb is best if harvested in the autumn[172], it resembles a cluster of cooked rice grains[207]. The green seedpods can be eaten raw or cooked. They are somewhat bitter[172].

nrakta Northern N. America - Washington to Alaska and eastwards to Siberia and Japan. ksakta Moist areas from sea level to 600 metres[60] in open woods and sub-alpine meadows[90].

propta Seed - best sown as soon as ripe in a cold frame, it should germinate in the spring[1]. Protect from frost[134]. Stored seed should be sown as soon as possible and can take a year or more to germinate[134]. Sow the seed quite thinly to avoid the need to prick out the seedlings. Once they have germinated, give them an occasional liquid feed to ensure that they do not suffer mineral deficiency. Once they die down at the end of their second growing season, divide up the small bulbs, planting 2 - 3 to an 8cm deep pot. Grow them on for at least another year in light shade in the greenhouse before planting them out whilst dormant. Division of offsets in August[1]. The larger bulbs can be planted out direct into their permanent positions, but it is best to pot up the smaller bulbs and grow them on in a cold frame for a year before planting them out in the autumn. Bulb scales[163].

nwatta A woodland plant, preferring a moraine or rock garden[1]. Easily grown in a light moist but well-drained sandy woodland soil[42, 163, 200]. Prefers a moist peaty soil and partial shade and must not be allowed to become dry[90]. Another report says that it prefers a sunny position[42] whilst yet another says that it succeeds in full sun or light shade in a rich soil[200]. The plants often grow close to the sea and survive periodic inundation with salt water[256]. The dormant bulb is very hardy and has withstood soil temperatures down to -20°C, though the embryonic flower shoot will be damaged at temperatures around -15°C[214]. A very ornamental plant[1], it is very variable in size and flower colour[90]. The flowers are sweetly scented[245]. Plants flower within 3 - 5 years from seed[164]. The plant is heat tolerant in zones 8 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

5.2.129 Balsamorhiza sagittata

Oregon Sunflower, Arrowleaf balsamroot
4 tin 8 cyuc 4 kcaak 2 tcan 2 dwat 0.3 m hkuc
htut cyutli kyuctup hwicli hrasljut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Balsamorhiza sagittata is a PERENNIAL growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcka Edible Parts: Leaves Root Seed Shoots Stem Edible Uses: CoffeeRoot - raw or cooked[46, 61, 106, 161, 257]. The root has a thick crown that is edible raw[213]. Roots have a sweet taste when cooked[2, 183]. A long slow baking is best, the Flathead Indians would bake them in a fire pit for at least 3 days[183]. The roots are resinous and woody with a taste like balsam[212]. Young shoots - raw or cooked[161, 257]. Added to salads or used as a potherb[183]. The large leaves and petioles are boiled and eaten[207]. When eaten in large quantities they act like sleeping pills to cause sleepiness[257]. The young flowering stem can be peeled and eaten raw like celery[183, 257]. Seed - raw or cooked[2, 94, 101, 161]. A highly prized source of food[257]. It can be roasted, ground into a powder and used with cereals when making bread[183, 257]. The raw seed can also be ground into a powder then formed into cakes and eaten without cooking[257]. The seed is rich in oil[213]. Oil. The seed was a prized source of oil for many native North Americans[257]. The roasted root is a coffee substitute[177, 183].

tcanta Hair InsulationThe large hairy leaves are used as an insulation in shoes to keep the feet warm[99]. An infusion of the root has been rubbed into the scalp to promote hair growth[257].

dwatta Antirheumatic Diaphoretic Diuretic Dysentery Febrifuge Odontalgic Poultice Skin Stomachic VulneraryOregon sunflower was quite widely employed as a medicinal herb by various native North American Indian tribes who used it to treat a variety of complaints, but especially stomach problems[257]. It is little used in modern herbalism. The root is antirheumatic, diuretic, cathartic, diaphoretic, febrifuge and vulnerary[94, 257]. An infusion of the leaves, roots and stems has been used as a treatment for stomach pains, colds, whooping cough, TB, fevers and headaches[257]. A decoction of the root has been taken at the beginning of labour to insure easy delivery[257]. The juice from the chewed root is allowed to trickle down the throat to treat sore mouths and throats whilst the root has also been chewed to treat toothaches[257]. The smoke from the root has been inhaled as a remedy for body aches such as rheumatism[257]. The root is chewed or pounded and used as a paste on wounds, blisters, bites, swellings and sores[207, 257]. A poultice made from the coarse, large leaves has been used to treat severe burns[257]. An infusion of the leaves has been used as a wash for poison ivy rash and running sores[257]. The seeds have been eaten as a treatment for dysentery[257].

nrakta Western N. America - South Dakota to British Columbia, south to California and Colorado. ksacta Open hillsides and flat land up to moderate elevations, especially on deep soils[60].

propta Seed - sow early spring in a greenhouse and only just cover the seed. Germination usually takes place within 2 - 6 days at 18°C. Either sow the seed in individual pots or pot up the seedlings as soon as they are large enough to handle and plant them out into their permanent positions in the summer[134]. Division in spring. Very difficult since the plant strongly resents root disturbance[134]. It is probably best to take quite small divisions, or basal cuttings, without disturbing the main clump. Pot these up into individual pots and keep them in light shade in the greenhouse until they are growing away well. Plant them out in the summer if they have grown sufficiently, otherwise over-winter them in the greenhouse and plant out in late spring.

nwatta Requires a deep fertile well-drained loam in full sun[134, 200]. Plants strongly resent winter wet[134, 200]. Hardy to at least -25°C[200]. Plants are intolerant of root disturbance and should be planted into their permanent positions whilst still small[134]. They withstand heavy grazing in the wild[212]. For polyculture design as well as the above-

ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

5.2.130 Hemerocallis citrina

Citron daylily

4 tin 8 cyuc 4 kcaak 2 tcan 1 dwat 0.8 m hkuc
hmimhtut cyutli kyuctup hwicli hrasljutnyikfrip hpa7tli flatprikwlis hpa7tmwatli dyatxre7t hjonli

drutta Hemerocallis citrina is a PERENNIAL growing to 0.8 m (2ft 7in) by 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcka Edible Parts: Flowers Leaves Root Edible Uses: Leaves and young shoots - cooked[205]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. The flowers can be dried and used as a thickener in soups etc. The slender trumpets vary from 12 - 17cm long[205]. They are from 7 to 65 buds on a flowering stem[205]. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked[205]. The flavour is somewhat radish-like but not so sharp[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China. ksacta Forest margins, grassy fields and slopes along valleys from near sea level to 2000 metres[266].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil[200]. Grows well in heavy clay soils. Succeeding in sun or shade, it produces more flowers in a sunny position though these flowers can be shorter-lived in very sunny positions[205]. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Plants are hardy to at least -20°C[187]. Widely cultivated in China for its edible flowers, especially in Hunan province[266]. Hybridizes freely with other members of this genus[200]. This species is said to be self-incompatible[127, 205]. Many of the plants in cultivation under this name are *H. thunbergii*[205]. The sub-species *H. citrina vespertina* (Hara.) Erhardt. is a very free-flowering form, producing up to 75 buds per scape and capable of flowering from July to October if the weather is suitable[205]. The plant forms a loose spreading clump[K]. The roots form pseudobulbs[205]. Plants take a year or two to become established after being moved[1]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. Individual flowers are very short-lived, they open in the late afternoon and die in the morning[200]. However, plants produce a succession of flowers for several weeks of the summer. The number of flowers on a scape varies from 7 to 65[205]. The flowers have a

ment[205]. Another report says that they have a pronounced honeysuckle scent[245].

5.2.131 Bunium bulbocastanum

Pig Nut, Earth-nut

4 tlin 8 cyuc 4 kcaak 0 tcan 1 dwat 0.6 m hkuc
hmtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwisslip
hpa7tmwatli fyifxre7t hjonli

drutta Bunium bulbocastanum is a PERENNIAL growing to 0.6 m (2ft) by 0.3 m (1ft in). See above for USDA hardness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Leaves Root Edible Uses: Condiment Root - raw or cooked[46, 61, 115]. A delicious taste very much like sweet chestnuts when cooked[2, K], but the tubers are very small and fiddly to harvest[183]. Seed and flowers. Used as a flavouring[61, 183], they are a cumin substitute[46]. Leaves - raw or cooked. They are used as a garnish and a flavouring in much the same way as parsley[46, 61, 183].

dwatta Astrigent Astringent[61].

nrakta Western and Southern Europe, including Britain, from the Netherlands to Italy. ksacta Rough grassland and banks on chalk[17].

propta Seed - sow spring in a cold frame. The seedlings only have one cotyledon[17]. Germination is usually free and quick, prick out the seedlings into individual pots as soon as they are large enough to handle and grow on for their first season in pots. Plant them out into their final positions when dormant in the autumn. The seed can also be sown in situ, but this is best done only if you have lots of seed since far fewer plants will result. Division in spring or autumn.

nwatta See the plants native habitat for ideas on its cultivation needs. The pig nut has at times been cultivated for its edible root[61]. Although quite small in the wild, there is a potential to improve the size of this root through selective breeding and cultivation. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

5.2.132 Hemerocallis littorea

Coastal Day Lily

4 tlin 8 cyuc 4 kcaak 2 tcan 1 dwat 0.9 m hkuc
hmimhtut cyutli kyuctup hwicli hrasjlutnyikfrp hpa7tli flatprikhwis hpa7tmwatli xre7t hjonli

drutta Hemerocallis littorea is a PERENNIAL growing to 0.9 m (3ft) by 0.6 m (2ft in). See above for USDA hardness. It is hardy to UK zone 4 and is not frost tender. It is in flower from August to September, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic[127, 137]. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Leaves and young shoots - cooked. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. They can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked. A pleasant nutty flavour. This sub-species has a fibrous root system[205].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205]. Attractive flowers. dwatta Antidote Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - Japan. ksacta Grassy places near the sea[58, 187].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[200] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Plants are hardy to about -15°C[187]. The plant has a fibrous root system[205]. Individual flowers are short-lived, opening in the morning and withering in the evening. The plant, however, produces a succession of flowers over a period of about 6 weeks[205]. Hybridizes freely with other members of this genus[200]. Unlike the type species, this form does produce viable seed[187]. Plants take a year or two to become established after being moved[200]. They can then spread quite freely[K]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

5.2.133 Hemerocallis yezoensis

4 tlin 8 cyuc 4 kcaak 0 tcan 1 dwat 0.8 m hkuc
hmimhtut cyutli kyuctup hwicli hrasjlutnyikfrp hpa7tli flatprikhwis hpa7tmwatli xre7t hjonli

drutta Hemerocallis yezoensis is a PERENNIAL growing to 0.8 m (2ft 7in). See above for USDA hardness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcakta Edible Parts: Flowers Leaves Edible Uses: Leaves and young shoots - cooked[105, 177]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[205]. The flowers can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China, Japan, Korea. ksacta Grassy places and marshy meadows near the sea[187].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. A very cold-hardy plant, tolerating temperatures down to about -25°C[187]. The roots are slender and not swollen[187]. The scapes carry between 4 and 12 blooms[205]. Hybridizes freely with other members of this genus[200]. It is closely related to *H. vespertina* Hara.[58]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

5.2.134 *Hemerocallis dumortieri*

Dumortier's daylily

4 tlin 8 cyuc 4 kcaak 3 tcan 1 dwat 0.5 m hkuc hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flat-prikwlis hpa7tmwatli xre7t hjonli

drutta *Hemerocallis dumortieri* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcakta Edible Parts: Flowers Leaves Shoots Edible Uses: Leaves and young shoots - cooked[105, 177, 183]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177, 205]. The flowers are crisp and juicy with a pleasant sweetness and no unpleasant after-taste[K]. They can be dried and used as a thickener in soups etc[183]. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked.

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205]. Plants form a slowly spreading clump and are suitable for ground cover when spaced about 45cm apart each way[208]. The dead leaves should be left on the ground in the winter to ensure effective cover[208].

dwatta Antidote Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - Japan, Korea. ksacta Meadows in the mountains of N. and C. Japan[58, 187].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil[200]. Grows well in heavy clay soils. Succeeding in sun or shade, it produces more flowers in a sunny position though these flowers can be shorter-lived in very sunny positions[205]. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. This species is hardy to about -20°C[187]. Hybridizes freely with other members of this genus[200]. Individual flowers only live for one day[205]. The flowers are sweetly scented[245]. Plants form a tight clump that spreads slowly[K]. The roots are cylindrical[205]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune

to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

5.2.135 *Origanum vulgare hirtum*

Greek Oregano

4 tlin 8 cyuc 4 kcaak 3 tcan 3 dwat 0.6 m hkuc hmimhtut cyutli kyuctcup hwicli hyishrasjlutnyik hpa7tli flat-prikwlis hpa7tmwatli xre7t hjonli

drutta *Origanum vulgare hirtum* is a PERENNIAL growing to 0.6 m (2ft) by 0.6 m (2ft in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, Lepidoptera (Moths and Butterflies). It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Leaves Edible Uses: Condition Leaves - raw or cooked as a potherb[5, 52, 183]. Oregano is an important flavouring herb in Mediterranean cookery, and is often used dried rather than fresh[238]. This sub-species has a much stronger flavour than the type[238]. The leaves are used as a flavouring for salad dressings, vegetables and legumes, and are frequently included in strongly flavoured dishes with chillies, garlic, onions etc[2, 13, 21, 27, 183, 238]. A nutritional analysis is available[218]. Much of the commercially available dried oregano does not come from this plant but from a number of different, often unrelated plants[238]. These include *Lippia graveolens*, *L. palmeri* and *Origanum syriacum*[238]. A herb tea is made from the dried leaves and flowering stems[183, 207, 238].

tcanta Dye Essential Antisepetic An essential oil from the plant is used as a food flavouring, in soaps and perfumery[115, 171]. A red or purple dye is obtained from the flowering tops[4, 7, 13, 100], it is neither brilliant nor durable[115]. The plant repels ants[46]. A useful ground cover for sunny positions, forming a slowly spreading clump[197, K].

dwatta Antiseptic Antispasmodic Carminative Cholagogue Diaphoretic Emmenagogue Expectorant Stimulant Stomachic Tonic Oregano has been used as a culinary and medicinal herb for thousands of years. It has a beneficial effect upon the digestive and respiratory systems and is also used to promote menstruation[254]. It should not be used medicinally by pregnant women though it is perfectly safe in small amounts for culinary purposes[254]. The leaves and flowering stems are strongly antiseptic, antispasmodic, carminative, cholagogue, diaphoretic, emmenagogue, expectorant, stimulant, stomachic and mildly tonic[4, 7, 9, 21, 254]. The plant is taken internally in the treatment of colds, influenza, mild feverish illnesses, indigestion, stomach upsets and painful menstruation[238]. It is strongly sedative and should not be taken in large doses, though mild teas have a soothing effect and aid restful sleep[244]. It should not be prescribed for pregnant women[238]. Externally, oregano is used to treat bronchitis, asthma, arthritis and muscular pain[238]. The plant can be used fresh or dried - harvest the whole plant (but not the roots) in late summer to dry and store for winter use[244]. Oregano is often used in the form of an essential oil that is distilled from the flowering plant[4]. A few drops of the essential oil, put on cotton wool and placed in the hollow of an aching tooth, frequently relieves the pain of toothache[4, 207]. This plant is one of the best natural antiseptics because of its high thymol content[7]. The essential oil is used in aromatherapy to treat the same kinds of complaints that the herb is used for[238].

nrakta S. Europe - Greece. ksacta Dry places in mountain regions in bushy places and on stony ground[50, 148].

propta Seed - sow early spring at 10 - 13°C and only just cover the seed. Germination usually takes place within 2 weeks. Prick out the seedlings into individual pots when they are large enough to handle and plant them out into their permanent positions in early summer. The seed can also be sown in situ in late spring. Division in March or October. Very easy, larger divisions can be planted out direct into their

permanent positions. We have found that it is better to pot up the smaller divisions and grow them on in light shade in a cold frame until they are well established before planting them out in late spring or early summer. Basal cuttings of young barren shoots in June. Very easy. Harvest the shoots with plenty of underground stem when they are about 8 - 10cm above the ground. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer.

nwatta Requires a rather dry, warm, well-drained soil in full sun, but is not fussy as to soil type, thriving on chalk[1, 27]. Prefers slightly alkaline conditions[200]. Tolerates poor soils[24]. Dislikes wet soils[37]. Often cultivated as a culinary herb, this is a sub-species from Greece, its flowers are white and it has a stronger fragrance. It is more commonly grown commercially because of its stronger fragrance. There are some named forms[183]. Plants growing near the sea have the most fragrance[7]. A good companion plant, improving the flavour of nearby plants. The flowers are very attractive to bees and butterflies[5, 30]. A good companion for the cucumber family[14], it is beneficial to all nearby plants[20]. The whole plant is strongly aromatic. Members of this genus are rarely if ever troubled by browsing deer[233]. The plant is heat tolerant in zones 10 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

6 5 tlin

6.1 bwon

6.1.1 Elaeagnus x ebbingei

Elaeagnus, Ebbing's Silverberry
tfo2n 5 tlin 9 cyuc 5 kcaak 4 tcan 2 dwat 5 m hkuc
pcmhmimhtut cyutli hgakuyctcup hwicli hyishrasjlutnyik
hpa7tli flatprikliwis hpa7tmwatli xre7i hjonli

drutta Elaeagnus x ebbingei is an evergreen Shrub growing to 5 m (16ft) by 5 m (16ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf all year, in flower from October to January, and the seeds ripen from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

kcakta Edible Parts: Fruit. Seed. Edible Uses: Fruit - raw or cooked[177]. A reasonable size, it is about 20mm long and 13mm wide although it does have a large seed[K]. The fully ripe fruit has a very rich flavour and makes pleasant tasting with a slight acidity[K]. The fruit should be deep red in colour and very soft when it is fully ripe, otherwise it will be astringent[K]. The flavour improves further if the fruit is stored for a day or two after being picked. The fruit ripens intermittently over a period of about 6 weeks from early to mid April until May[K]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous[K]. The taste is vaguely like peanuts[K].

tcanta Companion Hedge Hedge Plants can be grown as a hedge in very exposed positions, tolerating maritime exposure. The plants provide a very good protection from the

wind, they are very resistant to damage by salt winds and are also tolerant of regular trimming[75]. They have a strong vigorous growth and are faster growing than *E. macrophylla*[75, 200]. Because they fix atmospheric nitrogen, they make good companion plants and improve the growth of neighbouring species[K]. They can be planted in the line of an old shelter-belt of trees that is becoming bare at the base and will in time fill up the empty spaces and climb into the bottom parts of the trees[K].

dwatta Cancer The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta A garden hybrid, *E. macrophylla* x *E. pungens* or *E. x. reflexa*. ksacta Not known in the wild.

propta Seed - this is a hybrid and it will not breed true from seed. If this is not a problem, then the seed is best sown as soon as it is ripe in a cold frame[78]. It should germinate freely within 4 weeks, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pot as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Rather slow, but you usually get a good percentage rooting[78]. June is the best time to take cuttings[202]. Cuttings of mature wood of the current year's growth, 10 - 12cm with a heel, November in a frame. Leave for 12 months. Fair to good percentage[78]. Layering in September/October. Takes 12 months[78].

nwatta A very easily grown plant, it succeeds in most soils that are well-drained[11, 200]. Prefers a soil that is only moderately fertile, succeeding in poor soils and in dry soils[11, 200]. A drought resistant plant once established, it can be grown on top of Cornish hedges (drystone walls with earth between two vertical layers of stones). It is very tolerant of shade and grows well under trees[200]. Plants are very tolerant of maritime exposure, growing well right by the coast[K]. Plants are hardy to about -20°C, but they can be deciduous in very cold winters[200]. Fruiting as it does in early April to May, this plant has excellent potential as a commercial fruit crop in Britain. The fruit is of a reasonable size and when fully ripe is very acceptable for dessert[K]. It should be fairly easy to selectively breed for improved fruit size and flavour[K]. Not all plants bear many fruits, though many specimens have been seen that produce very heavy crops on a regular basis[K]. Since this is a hybrid species, yields may be improved by growing a selection of cultivars or one of the parent plants nearby for cross pollination. *E. pungens* is perhaps the best candidate for this and its cultivar *E. pungens* 'Variegata' has been seen on a number of occasions with good crops of fruit next to *E. x ebbingei* plants that are also laden with fruit[K]. The cultivar *E. x ebbingei* 'Gilt Edge' is also probably a good pollinator[K]. Other cultivars worth looking at are 'Salcombe Seedling', which is said to flower more abundantly than the type[200] and 'Limelight', which has been seen with a good crop of fruits even on small bushes[K]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. An excellent companion plant, when grown in orchards it can increase yields from the fruit trees by up to 10%. Plants produce very aromatic flowers in late autumn and early winter[182]. This species is notably resistant to honey fungus[88, 200]. Sometimes whole branches die out for no apparent reason. This happens most frequently when it is grafted onto *E. multiflora*[182]. These branches should be removed from the plant. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

6.1.2 Elaeagnus multiflora

Goumi, Cherry silverberry
tfo2n 5 tlin 9 cyuc 5 kcaak 3 tcan 2 dwat m hkuc
hmmihmtut cyutli hgatkuyuctcp hwicli hyishrasjlutnyik hpa7tli
flatprikliwis hpa7tmwatli xre7t hjonli

drutta Elaeagnus multiflora is a deciduous Shrub growing to 3 m (9ft) by 2 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from April to May, and the seeds ripen in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw or cooked[1, 3, 11, 15, 46, 177]. Pleasantly acid when ripe, they make a very good dessert fruit[K] though they are usually made into pies, preserves etc[183]. Quite fiddly and difficult to pick without breaking the young shoots[200]. The fruit must be fully ripe before it can be enjoyed raw, if even slightly under-ripe it will be quite astringent[K]. The fruit contains a single large seed[K]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous[K].

tcanta Companion Hedge Hedge Rootstock Plants can be grown as a hedge in exposed positions, tolerating maritime exposure. Reasonably fast growing and providing a good screen in the summer, though much more open in the winter. It is a good companion hedge to grow, the plants enriching the soil and improving the growth of neighbouring plants[K]. A hedge in a very exposed position at Rosewarne in N. Cornwall was 3.5 metres tall in 1989[K]. Often used as a rootstock for evergreen species that are hard to grow from cuttings. It frequently sprouts from the base and can out-compete the scion[182].

dwatta Antitussive Astringent Cancer The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavonoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214]. The leaves are used in the treatment of coughs[218]. The fruit is prescribed in the treatment of watery diarrhoea[218]. The root is astringent, a decoction is used to treat itch and foul sores[218].

nrakta E. Asia - China and Japan. ksacta Thickets and thin woods in hills and on lowland, at elevations of 600 - 1800 metres[58].

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate in late winter or early spring, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Good percentage[78]. Cuttings of mature wood of the current year's growth, 10 - 12cm with a heel, November in a frame. Leave for 12 months. Fair to good percentage[78]. Layering in September/October. Takes 12 months[78].

nwatta An easily grown plant[184], it succeeds in most soils that are well-drained[11, 200]. Prefers a soil that is only moderately fertile, succeeding in poor soils and in dry soils[11, 200]. Prefers a light sandy loam and a sunny position but succeeds in light shade[11, 200]. Very drought and wind resistant[1, 11, 200]. Tolerates atmospheric pollution[160]. Plants are hardy to about -20°C[184], but the roots are hardy to -30°C (although top growth will be killed at this temperature). A very variable species[266], it is often cultivated for its edible fruit in Japan, there are some named varieties[3, 11, 183]. Plants can crop in 4 years from cuttings[160]. They bear heavily in Britain[11]. The synonym *E. longipes* is sometimes accepted as a distinct species, differing mainly in having very long peduncles about 2.5cm

in length[214]. The fruit is well hidden in the shrub and is quite difficult to harvest without damaging the plant[K]. The ssp. *E. multiflora ovata*. (Maxim.) Servetaz. produces brown fruits on long stalks[200], would this be any easier to harvest?[K]. This species is notably resistant to honey fungus[88, 200]. Birds love the fruits[160]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. An excellent companion plant, when grown in orchards it can increase yields from the fruit trees by up to 10%. The small flowers are deliciously scented with a lilac-like smell, their aroma pervading the garden on calm days[K]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

6.1.3 Lathyrus tuberosus

Earthnut Pea, Tuberous sweetpea
tfo2n 5 tlin 9 cyuc 5 kcaak 3 tcan 0 dwat 1.2 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliwis
hpa7tmwatli xre7t hjonli

drutta Lathyrus tuberosus is a PERENNIAL growing to 1.2 m (4ft). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from June to July, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no records of toxicity have been found for this plant, the seed of some species in this genus contain a toxic amino acid that can cause a severe disease of the nervous system known as 'lathyrism' if they are eaten in large amounts (although small quantities are said to be nutritious)[65, 76]. Great caution is advised.

kcakta Edible Parts: Root Edible Uses: Root - cooked or raw[2, 27, 46, 61, 105]. Sweet and starchy, it is delicious when baked with a flavour that is somewhat like a sweet potato[183, K]. Taste trials consistently place this root very highly, it is certainly one of our favourites[K]. Unfortunately, yields are rather low and so the plant is only worthwhile growing as a taste treat, not as a staple crop[K].

tcanta Nitrogen fixer. Attractive flowers. Attracts wildlife.

nrakta Europe to W. Asia. Naturalized in Britain in a very few sites in E. England. ksacta Cornfields and hedgerows, avoiding acid soils[17].

propta Pre-soak the seed for 24 hours in warm water and then sow in early spring in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. If you have sufficient seed, then it can also be sown in situ in mid spring[200]. Division of the tubers when the plant is dormant in spring or autumn.

nwatta An easily grown plant, succeeding in any moderately good garden soil[200]. It prefers a limestone soil in a warm position[13], and likes some shade[1]. A climbing plant, scrambling through other plants and supporting itself by tendrils[219]. It tends to be slightly invasive[187] with new stems emerging at some distance from the parent plant[219]. The earthnut pea has occasionally been cultivated for its edible root[2, 183]. Slugs are inordinately fond of this plant and will totally destroy it given a chance[K]. A good bee plant. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc.

and size shown above) information on the habit and root pattern is also useful and given here if available. A suckering vine sending up suckers some distance main plant [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

6.1.4 *Elaeagnus multiflora ovata*

Goumi

tf02n 5 tlin 9 cyuc 5 kcaak 3 tcan 2 dwat m hkuc
hmmihmtut cyutli hpatkyuctucp hwicli hyishrasjlutnyik hpa7tli
flatprikliw hpa7tmwatli xre7t hjonli

drutta *Elaeagnus multiflora ovata* is a deciduous Shrub growing to 3 m (9ft) by 2 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from April to May, and the seeds ripen in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw or cooked[1, 3, 11, 15, 46, 177]. Pleasantly acid when ripe, they are usually made into pies, preserves etc[183]. Quite fiddly and difficult to pick without breaking the young shoots[200], this sub-species carries the fruit on longer stalks than the species and might therefore be easier to pick[K]. The fruit must be fully ripe before it can be enjoyed raw, if even slightly under-ripe it will be quite astringent[K]. The fruit is about 10mm long and contains a single large seed[275, K] Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous[K].

tcanta Hedge Hedge Rootstock Plants can be grown as a hedge in exposed positions, tolerating maritime exposure. A hedge in a very exposed position at Rosewarne in N. Cornwall was 3.5 metres tall in 1989[K]. Often used as a rootstock for evergreen species that are hard to grow from cuttings. It frequently sprouts from the base and can out-compete the scion[182].

dwatta Cancer The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta E. Asia - China and Japan. ksacta Thickets and thin woods in hills and on lowland, at elevations of 600 - 1800 metres[58].

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate in late winter or early spring, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pot as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Good percentage[78]. Cuttings of mature wood of the current year's growth, 10 - 12cm with a heel, November in a frame. Leave for 12 months. Fair to good percentage[78]. Layering in September/October. Takes 12 months[78].

nwatta An easily grown plant[184], it succeeds in most soils that are well-drained[11, 200]. Prefers a soil that is only moderately fertile, succeeding in poor soils and in dry soils[11, 200]. Prefers a light sandy loam and a sunny position but succeeds in light shade[11, 200]. Very drought and wind resistant[1, 11, 200]. Tolerates atmospheric pollution[160]. Plants are hardy to about -20°C[184], but the roots are hardy to -30°C (although top growth will be killed at this temperature). Cultivated for its edible fruit in Japan, there are some named varieties[3, 11, 183]. Plants can crop in 4 years from cuttings[160]. They bear heavily in Britain[11]. The fruit is well hidden in the shrub and is quite difficult to harvest without damaging the plant[K]. This sub-species produces brown fruits on long stalks[200], would this be any eas-

ier to harvest?[K] This species is notably resistant to honey fungus[88, 200]. Birds love the fruits[160]. There is some confusion over the correct name for this species. In the on-line version of the Flora of Japan it is referred to as *Elaeagnus montana ovata*[275]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. An excellent companion plant, when grown in orchards it can increase yields from the fruit trees by up to 10%. The small flowers are deliciously scented, their aroma pervading the garden on calm days[K].

6.1.5 *Pueraria montana lobata*

Kudzu Vine

tf02n 5 tlin 9 cyuc 4 kcaak 4 tcan 5 dwat m hkuc
htut cyutli hqattucp hwicli hrasjlutnyik hpa7tli flatprikliw
hpa7tmwatli xre7t hjonli

drutta *Pueraria montana lobata* is a PERENNIAL CLIMBER growing to 10 m (32ft 10in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought.

pcista Although no specific mention has been found for this species, the leaves of the closely related *P. hirsuta* (which might be no more than a synonym for this species) have barbed hairs and these can cause severe irritation[151]. Possible interaction with antiplatelet and antidiabetic medication. Rare case of a patient developing bleeding after surgery possibly due to Kudzu [301].

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Root - cooked[105, 171]. Rich in starch[109]. The root can be up to 1.8 metres long[174] and has been known to weigh 35 kilos or more[269]. The root contains about 10% starch, this can be extracted and used as a crispy coating in deep fried foods, or for thickening soups etc[174, 183]. It can also be made into noodles, or like agar or gelatine is used as a gelling agent for salads[183]. This plant is a staple food in Japan, the peeled root contains about 2.1% protein, 0.1% fat, 27.1% carbohydrate, 1.4% ash[179]. The starch of the roots contains (per 100 g) 340 calories, 16.5 percent moisture, 0.2 g protein, 0.1 g fat, 83.1 g total carbohydrate, 0.1 g ash, 35 mg Ca, 18 mg P, 2.0 mg Fe, and 2 mg Na[269]. A nutritional analysis for the whole root is available. Flowers - cooked or made into pickles[183]. Stems and young leaves - raw or cooked[105]. A very nutritious food, the fresh young shoots taste like a cross between a bean and a pea[183]. The cooked leaves contain (per 100 g) 36 calories, 89.0 percent moisture, 0.4 g protein, 0.1 g fat, 9.7 g total carbohydrate, 7.7 g fiber, 0.8 fat, 34 mg Ca, 20 mg P, 4.9 mg Fe, 0.03 mg thiamin, 0.91 mg riboflavin, 0.8 mg niacin[269].

tcanta Fibre Fodder Paper Soil reclamation Soil stabilization A tough, strong fibre from the stems is used to make ropes, cables, coarse cordage and textiles[61, 109, 151, 169, 189]. The fibre is 2 - 3mm long and can be used to make paper. Straight first year stems, 2 - 2.7 metres long, are harvested in mid summer, the leaves are removed and the stems steamed until the fibres can be stripped. The fibres are then cooked for 2 hours with lye, tough vines might require 4 hours cooking, and the fibre put in a ball mill for 3 hours. The resulting paper is greenish/cream in colour[189]. Can be used as a ground cover plant in a sunny position[188]. Plants have an extensive root system which can be 1.8 metres deep, they are used for erosion control and for rebuilding depleted soils[171, 174]. A member of the Leguminosae, so it adds nitrogen to the soil through the actions of root bacteria.

dwatta Antidiarrhoeal Antidote Antiemetic Antihistamine Antineoplastics Antipruritic Antipsoriatic Antipyretic Antispasmodic Antivinous Cardiac Demulcent Depurative Diaphoretic Dysentery Febrifuge Galactagogue Hypoglycaemic Hypotensive Styptic The kudzu vine, known as Ge Gen in China, is commonly used in Chinese herbalism, where it is considered to be one of the 50 fundamental herbs[218]. Recent research has shown that compounds called 'daidzin'

and 'daidzein', which are found in the roots and the flowers, are a safe and effective method for treating alcohol abuse[238]. They work by suppressing the appetite for alcohol, whereas existing treatments interfere with the way the alcohol is metabolised and can cause a build-up of toxins[238]. The plant is often used in combination with *Chrysanthemum x morifolium* in treating alcohol abuse[254]. The flowers and the roots are antidote, antiemetic, antipruritic, antispasmodic, demulcent, diaphoretic, digestive, febrifuge, hypoglycaemic and hypotensive[174, 176, 218, 222, 238]. A concoction of the flowers and tubers is used to treat alcoholism, fever, colds, diarrhoea, dysentery, acute intestinal obstruction etc[174, 176, 218, 222]. It is useful in the treatment of angina pectoris and migraine[218]. The root is frequently used as a remedy for measles, often in combination with *Cimicifuga foetida*[254]. The root contains puerarin. This increases the blood flow to the coronary artery and protects against acute myocardial ischaemia caused by the injection of pituitrin[176]. The root can be harvested from the autumn to the spring and is used fresh or dried[238]. The flowers are harvested just before they are fully open and are dried for later use[238]. The stems are galactogogue and are also applied as a poultice to incipient boils, swellings, sore mouths etc[218, 222]. The seed is used in the treatment of hangover and dysentery[218, 222]. The leaves are styptic[218].

nrakta E. Asia - China, Japan, Korea. ksacta Thickets and thin woods all over Japan[58].

propta Pre-sok the seed for 12 hours in warm water and sow in a warm greenhouse in early spring. Germination should take place within 2 weeks. Prick out the seedlings into individual pots when they are large enough to handle and plant them out after the last expected frosts[200]. Cover the young plants with a frame or cloche until they are growing away well. Division of young shoots from the crown. The young shoots are removed in the spring with some of the underground part of the stem, preferably with some roots already formed. They are potted up and will usually develop new roots from the nodes. They are planted out in the summer if growth is sufficient, otherwise they are grown on in pots for a year and planted out late the following spring.

nwatta Agroforestry Services: Nitrogen Fodder: Bank Fodder: Pasture Industrial Crop: Fiber Management: Hay Minor Global Crop Staple Crop: ProteinGrows best on well-drained loam soil of good fertility[269]. Succeeds in most well-drained soils in a sunny position[200], though it does not make good growth on very light poor sand or on poorly drained heavy clay[269]. Plants cannot stand waterlogging on any soil[269]. A deep-rooted pant, once established it is very drought resistant[171, 269]. The plant is reported to tolerate an annual precipitation in the range of 97 to 214cm, an annual mean temperature in the range of 12.2 to 26.7°C, and a pH of 5.0 to 7.1[269]. Plants are hardy to about -15°C, they can resprout from the base if they are cut down by frosts[200]. A twining plant, the top growth is not generally hardy in Britain and plants do not always flower here[1]. Plants can be grown as annuals in Britain, the seed is started off in a greenhouse and is planted out after the last frosts[1]. They can grow up to 6 metres in their first year and make good temporary screens[1]. The plant succeeds outdoors in Berlin, but it has to be propagated vegetatively there[74]. This plant is cultivated for its edible root in Japan and China[183]. The flowers have a sweet vanilla scent[245]. When grown in warmer climates than Britain the root can be invasive and plants have become weeds[182, 219]. Introduced into the southern N. American states in 1876 as a soil stabilizer, the plant has spread very widely (it can grow up to 30cm in a day), has swamped out native vegetation, including large trees. It is considered to be one of the most obnoxious weeds in that region[274]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200].

6.1.6 *Trigonella foenum*

Fenugreek, Sicklefruit fenugreek

tfo2n 5 tlin 9 cyuc 4 keak 0 tcan 5 dwat 0.6 m hkuc

htut ctytlyt kyuctyucp hwiclyt hrasjrlutjyic hpa7tli flatrikrikyic hpa7tmwatli xre7t hjonli

drutta *Trigonella foenum-graecum* is a ANNUAL growing to 0.6 m (2ft) by 0.4 m (1ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. It is in flower from June to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

pcista The seed contains 1% saponins[240]. Although poisonous, saponins are poorly absorbed by the human body and so most pass through without harm. Saponins are quite bitter and can be found in many common foods such as some beans. They can be removed by carefully leaching the seed or flour in running water. Thorough cooking, and perhaps changing the cooking water once, will also remove most of them. However, it is not advisable to eat large quantities of food that contain saponins. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K]. Care for diabetics on antidiabetic allopathic as may lower blood sugar. Can affect drug absorption as high fibre content. Constituents can alter the effects of monoamine oxidase inhibitors [301].

kcakta Edible Parts: Leaves Seed SeedpodEdible Uses: Coffee Condiment TeaSeed - cooked or sprouted and eaten raw[2, 4, 21, 34]. It has quite a strong spicy flavour, not unlike lovage or celery[4, 183]. When ground into a powder, the seed is a principal ingredient of curries and mango chutney[244], it is also used in pickles and spice mixes, as a flavouring in bread etc[4, 183, 238]. The seed is usually lightly roasted before use in order to reduce the bitterness[238]. The seed is about 3mm long, about 10 - 20 seeds being produced in each pod[4]. A good source of many essential elements such as iron, phosphorus and sulphur[244], the seed contains about 6% moisture, 23% protein, 10% carbohydrate, 8% fat, 10% fibre and 4.3% ash[61]. The ground seeds are used to give a maple syrup flavour to foods[183]. The seed can be soaked for 12 hours in warm water and then allowed to sprout for 3 - 5 days[244]. These sprouted seeds have a spicy flavour and can be added to salads or cooked[238, K]. An essential oil obtained from the seed is used as a food flavouring in imitation maple syrup, vanilla compositions, liquorice, pickles etc[183]. It also has medicinal virtues[57]. The ground up seeds can also be used as a substitute for maple syrup[4]. Leaves - raw or cooked[2, 4, 7, 34]. Very aromatic, in small quantities they can be added to salads, otherwise they are used as a potherb, a flavouring for root vegetables, an ingredient of curries etc[183, 238]. Seedpods - cooked[105]. The roasted seed is a coffee substitute[2, 177, 183]. A soothing tea is made from the leaves and the seed[21, 183].

tcanta Cosmetic Dye Essential Green manure Hair ParasiticideAn essential oil is obtained from the seed - used as a food flavouring and medicinally. The dried plant has a strong aroma of hay[4]. The crushed seed, mixed with oil and massaged into the scalp, is recommended for glossy hair[244]. An infusion of the seed, used as a skin lotion, is said to be good for the complexion[244]. A good green manure crop, it is fast growing and vigorous[200], producing a lot of bulk and fixing a large quantity of atmospheric nitrogen[87]. A yellow dye is obtained from the seed[61].

dwatta Anticholesterolemic Antiinflammatory Antiphlogistic Antitumor Appetizer Cardiotonic Carminative Demulcent Deobstruent Diuretic Emollient Expectorant Febrifuge Galactogogue Hypoglycaemic Hypotensive Laxative Parasiticide RestorativeFenugreek is much used in herbal medicine, especially in North Africa, the Middle East and India. It has a wide range of medicinal applications[254]. The seeds are very nourishing and are given to convalescents and to encourage weight gain, especially in anorexia nervosa[254]. The seeds should not be prescribed medicinally for pregnant women since they can induce uterine contractions[238, 254]. Research has shown that the seeds can inhibit cancer of the liver, lower blood cholesterol levels and also have an antidiabetic effect[254]. The seed and leaves are anticholesterolemic, anti-inflammatory, antitumor, carminative, demulcent, deobstruent, emollient, expectorant, febrifuge, galactogogue, hypoglycaemic, laxative, parasiticide, restora-

and uterine tonic[4, 7, 21, 147, 165, 176, 238]. The seed yields a strong mucilage and is therefore useful in the treatment of inflammation and ulcers of the stomach and intestines[4, 254]. Taken internally, a decoction of the ground seeds serves to drain off the sweat ducts[7]. The seed is very nourishing and body-building and is one of the most efficacious tonics in cases of physical debility caused by anaemia or by infectious diseases, especially where a nervous factor is involved[7, 244]. It is also used in the treatment of late-onset diabetes, poor digestion (especially in convalescence), insufficient lactation, painful menstruation, labour pains etc[238, 244]. The seeds freshen bad breath and restore a dulled sense of taste[254]. Externally, the seeds can be ground into a powder and used as a poultice for abscesses, boils, ulcers, burns etc, or they can be used as a douche for excessive vaginal discharge[4, 244, 254]. The leaves are harvested in the growing season and can be used fresh or dried[238]. The seeds are harvested when fully ripe and dried for later use[238]. Compounds extracted from the plant have shown cardiotoxic, hypoglycaemic, diuretic, antiploidy and hypotensive activity[218]. One of its constituent alkaloids, called 'trigonelline', has shown potential for use in cancer therapy. The seed contains the saponin diosgenin, an important substance in the synthesis of oral contraceptives and sex hormones[244], whilst saponins in the plant have been extracted for use in various other pharmaceutical products[238]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Trigonella foenum-graecum* for loss of appetite, inflammation of the skin (see [302] for critics of commission E).

nrakta Europe - S. France. ksacta Field verges, uncultivated ground, dry grasslands and hillsides[200].

propta Pre-soak the seed for 12 hours in warm water and then sow in spring in situ.

nwatta Succeeds in ordinary garden soil[1], preferring a well-drained loamy soil in full sun[200]. Requires a warm, sheltered position in Britain[244]. Plants are hardy to about -15°C[238]. Fenugreek is widely cultivated for its edible seed in warm temperate and tropical regions, there are some named varieties[183]. Seed production is more problematic in Britain due to the cooler and moister summers. The seed is ripened intermittently over a period of some weeks making harvesting more complicated[87]. Plants take about 16 weeks to mature in warmer climes, probably about 4 weeks longer in Britain[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. When removing plant remains at the end of the growing season, it is best to only remove the aerial parts of the plant, leaving the roots in the ground to decay and release their nitrogen.

6.2 mran

6.2.1 *Castanea sativa*

Sweet Chestnut, European chestnut
5 tlin 7 cyuc 5 kcaok 5 tcan 2 dwat 30 m hkuc
-htut cyutli hgatkyuctcup hwicli hyishrasljutnyik hpa7tli frus-
flatprik hpa7tmwatli hjonli

drutta *Castanea sativa* is a deciduous Tree growing to 30 m (98ft) by 15 m (49ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in July, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

kcaakta Edible Parts: SeedEdible Uses: Coffee SweetenerSeed - raw or cooked[2, 4, 5, 9, 12, 34]. A somewhat astringent taste raw, it improves considerably when cooked and is delicious baked with a floury texture and a flavour rather like sweet potatoes[K]. The seed is rich in carbohydrates, it can be dried, then ground and used as a flour in breads,

paddings, as a thickener in soups etc[7, 63, 132, 183]. The roasted seed can be used as a coffee substitute[183]. A sugar can be extracted from the seed[183].

tcanta Basketry Fuel Hair Starch Tannin WoodTannin is obtained from the bark[46, 223]. The wood, leaves and seed husks also contain tannin[223]. The husks contain 10 - 13% tannin[223]. On a 10% moisture basis, the bark contains 6.8% tannin and the wood 13.4%[223]. The meal of the seed has been used as a source of starch and also for whitening linen cloth[4]. A hair shampoo is made from the leaves and the skins of the fruits[7]. It imparts a golden gleam to the hair[7]. Wood - hard, strong, light. The young growing wood is very durable, though older wood becomes brittle and liable to crack[4]. It is used for carpentry, turnery, props, basketry, fence posts etc[4, 6, 7, 23, 46, 100]. A very good fuel[6].

dwatta Antidiarrhoeal Antiinflammatory Astringent Bach ExpectorantAlthough more commonly thought of as a food crop, sweet chestnut leaves and bark are a good source of tannins and these have an astringent action useful in the treatment of bleeding, diarrhoea etc. The leaves and bark are anti-inflammatory, astringent, expectorant and tonic[4, 7, 165]. They are harvested in June or July and can be used fresh or dried[4]. An infusion has been used in the treatment of fevers and ague, but are mainly employed for their efficacy in treating convulsive coughs such as whooping cough and in other irritable conditions of the respiratory system[4, 7]. The leaves can also be used in the treatment of rheumatism, to ease lower back pains and to relieve stiff muscles and joints[254]. A decoction is a useful gargle for treating sore throats[254]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Extreme mental anguish', 'Hopelessness' and 'Despair'[209].

nrakta S. Europe. Long naturalized in Britain[17]. ksacta Woods in mountains[100].

propta Seed - where possible sow the seed as soon as it is ripe in a cold frame or in a seed bed outdoors[78]. The seed must be protected from mice and squirrels. The seed has a short viability and must not be allowed to become dry. It can be stored in a cool place, such as the salad compartment of a fridge, for a few months if it is kept moist, but check regularly for signs of germination. The seed should germinate in late winter or early spring. If sown in an outdoor seedbed, the plants can be left in situ for 1 - 2 years before planting them out in their permanent positions. If grown in pots, the plants can be put out into their permanent positions in the summer or autumn, making sure to give them some protection from the cold in their first winter[K].

nwatta Global Crop Industrial Crop: Biomass Industrial Crop: Tannin Management: Standard Staple Crop: Balanced carbPrefers a good well-drained slightly acid loam in a sunny position but it also succeeds in dry soils[1, 11, 200, 238]. Once established, it is very drought tolerant[1, 11, 200, 238]. Plants are very tolerant of highly acid, infertile dry sands[200]. Averse to calcareous soils but succeeds on harder limestones[11, 200]. Tolerates maritime exposure though it is slower growing in such a position[75]. The dormant plant is very cold-hardy in Britain, though the young growth in spring, even on mature plants, is frost-tender[K]. The sweet chestnut is often cultivated for its edible seed in warm temperate zones, there are several named varieties[46, 183]. Both 'Marron de Lyon' and 'Paragon' produce fruits with a single large kernel (rather than 2 - 4 smaller kernels) and so are preferred for commercial production[238]. *Castanea sativa* x *crenata*: The hybrid sweet chestnut 'Marigoule' is a good choice If you only want to grow one tree as Marigoule is a partly self-fertile cultivar. Sweet chestnuts require a warm dry summer in order to ripen their fruit properly in Britain[63] and even then these seeds are generally inferior in size and quality to seeds grown in continental climates[4]. Most species in this genus are not very well adapted for the cooler maritime climate of Britain, preferring hotter summers, but this species grows well here[11, 200]. An excellent soil-enriching understorey in pine forests[200]. Flowers are produced on wood of the current year's growth[229] and they are very attractive to bees[7]. Plants are fairly self-sterile[200]. They hybridize freely with other members of this genus[200]. At one time this tree was widely grown in coppiced woodlands for its wood, but the practise of coppicing has fallen into virtual disuse[11]. Trees regrow very quickly after being cut down, producing utilizable timber every 10 years. This species is not often seen in Cornwall though it grows very well

there[59]. Trees take 30 years from seed to come into bearing[98]. Plants in this genus are notably resistant to honey fungus[200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fleshy. Thick or swollen - fibrous or tap root [2-1].

6.2.2 *Sassafras albidum*

Sassafras, Common Sassafras

5 tlin 9 cyuc 5 kcaak 3 tcan 3 dwat 25 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli nyanhjen hjonli

drutta *Sassafras albidum* is a deciduous Tree growing to 25 m (82ft) by 15 m (49ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from April to October, in flower from May to June, and the seeds ripen from September to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The extracted essential oil is poisonous in large quantities[4, 165]. The essential oil contains safrole which is known to be carcinogenic and potentially harmful to the liver[274]. The essential oil has been banned as a food flavouring in America, even though the potential toxicity is lower than that of alcohol[222].

kcakta Edible Parts: Leaves Edible Uses: Condiment Tea Leaves - raw or cooked. The young leaves can be added to salads whilst both old and young leaves can be used as a flavouring and as a thickening agent in soups etc[2, 20, 55, 62, 82, 102, 183]. They have a mild aromatic flavour[K]. The leaves are often dried and ground into powder for later use[82, 159, 183]. The young shoots have been used to make a kind of beer[4]. The dried root bark can be boiled with sugar and water until it forms a thick paste[183]. It is then used as a condiment[183]. The root and the berries can also be used as flavourings[55, 142]. Winter buds and young leaves - raw[62, 183]. A tea is made from the root bark, it is considered to be a tonic[18, 20, 55, 62]. The tea can also be made by brewing the root in maple syrup, this can be concentrated into a jelly[183]. A tea can also be made from the leaves and the roots. It is best in spring. A tea can be made from the flowers[2].

tcanta Companion Dye Essential Repellent Wood An essential oil is obtained from the bark of the root[61] and also from the fruits[4]. One hundred kilos of root chips yield one litre of essential oil under steam pressure - this oil comprises about 90% safrol[245]. The oil is medicinal and is also used in soaps, the coarser kinds of perfumery, toothpastes, soft drinks etc[4, 46, 57, 82]. It is also used as an antiseptic in dentistry[61]. A yellow dye is obtained from the wood and the bark[4, 168]. It is brown to orange[168]. The plant repels mosquitoes and other insects[18, 20]. Wood - coarse-grained, soft, weak, fragrant, brittle, very durable in the soil. It weighs 31lb per cubic foot and is used for fence posts and items requiring lightness[46, 82, 171, 227].

dwatta Alterative Anodyne Antirheumatic Antiseptic Aromatic Carminative Diaphoretic Diuretic Stimulant Vasodilator *Sassafras* has a long history of herbal use. It was widely employed by many native North American Indian tribes who used it to treat a wide range of complaints, valuing it especially for its tonic effect upon the body[257]. It is still commonly used in herbalism and as a domestic remedy. The root bark and root pith are alterative, anodyne, antiseptic, aromatic, carminative, diaphoretic, diuretic, stimulant and vasodilator[4, 21, 46, 165]. A tea made from the root bark is particularly renowned as a spring tonic and blood purifier as well as a household cure for a wide range of ailments such as gastrointestinal complaints, colds, kidney ailments, rheumatism and skin eruptions[222, 238, 257]. The mucilaginous pith from the twigs has been used as a poultice or wash for eye ailments and is also taken internally as a tea for chest, liver and kidney complaints[222]. An essential oil from the root bark is used as an antiseptic in dentistry and also as

an anodyne[213]. The oil contains safrole, which is said to have carcinogenic activity and has been banned from use in American foods - though it is less likely to cause cancer than alcohol[222]. In large doses the oil is poisonous, causing dilated pupils, vomiting, stupor, collapse and kidney and liver damage[4, 238]. The oil has been applied externally to control lice and treat insect bites, though it can cause skin irritation[238].

nrakta Eastern N. America - Maine to Ontario, south to Florida and Texas. *ksakta* Deciduous woodlands and thickets on rich sandy well-drained soils[43, 62, 159, 165]. Found on moist soils[82].

propta Seed - best sown as soon as ripe in a cold frame[200]. Stored seed requires 4 months cold stratification at 4°C[113]. It is best sown as early in the year as possible. Prick out the seedlings into individual pots as soon as possible and grow them on in the greenhouse. One report says to harden off the plants as soon as possible[78], but young plants are frost-tender[11] and so we recommend growing them on in the greenhouse for their first winter and then planting them out in early summer. Give the young trees some protection for at least their first winter outdoors[K]. Root cuttings, taken from suckers, 1 - 2cm long taken in December. Plant horizontally in pots in a greenhouse[78]. Suckers in late winter. Plant straight out into their permanent positions[200].

nwatta Landscape Uses: Pest tolerant, Massing, Specimen, Woodland garden. Requires a deep, fertile, well-drained, lime-free, near neutral soil in sun or light shade[11, 200]. Does well in a woodland garden[166], especially in a sheltered position along the edge[200]. The plant is tender when young, the young shoots of older trees can also be damaged by late spring frosts[11, 238]. A very ornamental plant[1] with a wide range of uses, it is occasionally cultivated and often gathered from the wild[61]. All parts of the tree contain essential oils and give off a pleasant spicy aroma when crushed[229]. The stem bark is highly aromatic, more so than the wood. The root stem bark is the most pleasant of all[245]. The flowers have a spicy perfume[245]. Trees are long-lived, moderately fast-growing and disease-free in the wild[227, 229]. They can begin flowering when only 10 years old and good seed crops are usually produced every 2 - 3 years[229]. The trees spread by root suckers and can form thickets[229]. Although some flowers appear to be hermaphrodite, they are functionally either male or female and most trees are dioecious[229]. Both male and female plants must be grown if seed is required. Special Features: North American native, Attracts butterflies, Fragrant flowers, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 3. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

6.2.3 *Morus nigra*

Black Mulberry

5 tlin 9 cyuc 5 kcaak 3 tcan 3 dwat 10 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli nyif hjonli

drutta *Morus nigra* is a deciduous Tree growing to 10 m (32ft) by 15 m (49ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from May to June, and the seeds ripen from August to September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil.

pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit **Edible Uses:** Fruit - raw, cooked or used in preserves[1, 2, 3, 4, 7, 9, 183]. A delicious slightly acid flavour, it makes an excellent dessert fruit and can be eaten in quantity[K]. The fruit is juicy and refreshing, though it must be used as soon as it is ripe (from mid-August to September) otherwise it will start to rot[200]. The fruit falls from the tree as soon as it is fully ripe. It is best, therefore, to grow the tree in short grass to cushion the fall of the fruit but to still make it possible to find and harvest[K]. The fruit can also be dried and ground into a powder[183]. The fruit is up to 25mm in diameter[200, 227]. White Mulberry (*Morus alba*) has edible young leaves and shoots eaten cooked[105, 183] but we have found no information for this plant.

tcanta Dye Fibre WoodA fibre used in weaving is obtained from the bark[7]. A red-violet to dark purple dye is obtained from the fruit[168]. A yellow-green dye is obtained from the leaves[168]. Wood - used in joinery[100].

dwatta Anthelmintic Astringent Homeopathy Hypoglycaemic Laxative Odontalgic Purgative UrinaryThe mulberry has a long history of medicinal use in Chinese medicine, almost all parts of the plant are used in one way or another[238]. The white mulberry (*M. alba*) is normally used, but this species has the same properties[238]. Recent research has shown improvements in elephantiasis when treated with leaf extract injections and in tetanus following oral doses of the sap mixed with sugar[238]. Analgesic, emollient, sedative[7, 176]. The leaves are antibacterial, astringent, diaphoretic, hypoglycaemic, odontalgic and ophthalmic[218, 238]. They are taken internally in the treatment of colds, influenza, eye infections and nosebleeds[238]. The leaves are collected after the first frosts of autumn and can be used fresh but are generally dried[238]. The stems are antirheumatic, diuretic, hypotensive and pectoral[218, 238]. A tincture of the bark is used to relieve toothache[7]. The branches are harvested in late spring or early summer and are dried for later use[238]. The fruit has a tonic effect on kidney energy[218, 238]. It is used in the treatment of urinary incontinence, tinnitus, premature greying of the hair and constipation in the elderly[238]. Its main use in herbal medicine is as a colouring and flavouring in other medicines[4]. The root bark is antitussive, diuretic, expectorant and hypotensive[238]. It is used internally in the treatment of asthma, coughs, bronchitis, oedema, hypertension and diabetes[238]. The roots are harvested in the winter and dried for later use[238]. The bark is anthelmintic and purgative, it is used to expel tape worms[4, 240]. Extracts of the plant have antibacterial and fungicidal activity[218]. A homeopathic remedy is made from the leaves[9]. It is used in the treatment of diabetes[9].

nrakta W. Asia? ksacta Original habitat is obscure.

propta The seed germinates best if given 2 - 3 months cold stratification[80, 98]. Sow the seed as soon as it is ripe if possible, otherwise in February in a cold frame. The seed usually germinates in the first spring, though it sometimes takes another 12 months. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the cold frame for their first winter. Plant them out in late spring or early summer after the last expected frosts. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Plant out in spring. A good percentage take, though they sometimes fail to thrive[78, 113]. Cuttings of mature wood of the current season's growth, 25 - 30cm with a heel of 2 year old wood, autumn or early spring in a cold frame or a shady bed outside[78, 113, 200]. Bury the cuttings to threequarters of their depth. It is said that cuttings of older wood up to 2.5 metres long can be readily made to strike[4]. The cuttings are taken in February and planted 30cm deep in a shady sheltered position outdoors. The stem is wrapped in moss to prevent water loss by transpiration, with only the top few buds not being covered[4]. Layering in autumn[200].

nwatta Prefers a warm moist but well-drained loamy soil in a sheltered sunny position[1, 11]. Prefers a light soil[37]. Plants are very tolerant of atmospheric pollution[4]. Trees are hardy as far north as southern Sweden[4]. A slow growing[200] but very ornamental tree[1], the mulberry is sometimes cultivated in gardens for its delicious edible fruit[183]. The tree is not grown on a commercial scale because the fruit

is too soft and easily damaged to allow it to be transported to market, and is therefore best eaten straight from the tree. There are some named varieties[183]. The mulberry takes many years to settle down and produce good crops of fruit, about 15 years being the norm[4]. Trees fruit well in southern and south-western Britain[59, 200] but they require the protection of a wall further north if the fruit is to ripen[200]. This is a good tree for growing grapes into[20]. It means that the grapes are difficult to pick, but they always seem to be healthier and free from fungal diseases[201]. Plants are late coming into leaf and also lose their leaves at the first autumn frosts though the tree in leaf casts quite a dense shade[200]. Mulberries have brittle roots and so need to be handled with care when planting them out[238]. Any pruning should only be carried out in the winter when the plant is fully dormant because mulberries bleed badly when cut[238]. Ideally prune only badly placed branches and dead wood[238]. Once considered to be a very long-lived tree, doubts are now being cast on this assumption, it is probably fairly short-lived[11]. Plants in this genus are notably resistant to honey fungus[200]. The plant is heat tolerant in zones 9 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

6.2.4 *Cornus kousa*

Japanese Dogwood, Kousa dogwood, Chinese Dogwood, 5 tin 8 cyuc 5 kcac 2 tcan 0 dwat 10 m hkuc hmimhtup cyutli tcup hwicli hrasjlutnykifrip hpa7tli flatprikli-wis hpa7tmwtli xre7t hjonli

drutta *Cornus kousa* is a deciduous Tree growing to 10 m (32ft) by 6 m (19ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit **Leaves/Edible Uses:** Fruit - raw or cooked[61, 177]. Sweet and juicy[11, 183], it is very nice in small quantities[K]. Very seedy[105]. The skin is rather tough and unpleasant, but the pulp is delicious with a custard-like texture, it is one of our favourite late summer fruits[K]. The fruit is about 2cm in diameter[200]. Young leaves - cooked[105, 177, 183].

tcanta WoodWood - very hard and heavy. Used for materials[151].

nrakta E. Asia - China, Japan, Korea. ksacta Woods and scrub in the mountains of Sichuan[109]. Valleys, shaded slopes, by streams and roadsides, in mixed, sparse, and dense woods at elevations of 400 - 2200 metres[266].

propta Seed - best sown as soon as it is ripe in a cold frame or in an outdoors seedbed if there is sufficient seed[80, 113]. The seed must be separated from the fruit flesh since this contains germination inhibitors[80, 164]. Stored seed should be cold stratified for 3 - 4 months and sown as early as possible in the year[164]. Scarification may also help as may a period of warm stratification before the cold stratification[80, 164]. Germination, especially of stored seed, can be very slow, taking 18 months or more[164]. Prick out the seedlings of cold-frame sown seeds into individual pots as soon as they are large enough to handle and grow the plants on for their first winter in a greenhouse, planting out in the spring after the last expected frosts. Cuttings of half-ripe side shoots, July/August in a frame[188]. Cuttings of mature wood of the current year's growth, taken with a heel if possible, autumn in a cold frame. High percentage[78]. Layering

new growth in June/July. Takes 9 months[78].
 nwatta Landscape Uses:Pest tolerant, Specimen, Woodland garden. An easily grown plant, it succeeds in any soil of good or moderate fertility, from acid to slightly alkaline but dislikes shallow chalky soils[184, 188]. Grows well in heavy clay soils. Prefers a rich well-drained loamy soil and a position that is at least partially sunny[11]. A very ornamental plant[1], it is hardy to about -20°C[184]. A number of named forms have been developed for their ornamental value[182]. Plants are slow-growing when young, they speed up somewhat after a few years but then soon slow down again[202]. The sub-species of *C. kousa chinensis* grows more freely, flowering and fruiting better in Britain though it barely differs in appearance from the species[11]. This species has been known to hybridize with *C. capitata*[182]. The cultivar 'Norman Hadden' could be such a hybrid[182]. Plants in this genus are notably resistant to honey fungus[200].
 (Special Features:Attracts birds, Not North American native, Blooms are very showy. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

6.2.5 *Cornus kousa chinensis*

Japanese Dogwood
 5 tlin 8 cyuc 5 kcaak 2 tcan 0 dwat 10 m hkuc
 hmimhtut cyutli tcup hwicli hrasjlutnyikfrp hpa 7tli flatprik-lwis hpa 7tmwatli xre 7t hjonli
 drutta *Cornus kousa chinensis* is a deciduous Tree growing to 10 m (32ft) by 6 m (19ft). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.
 kcaaka Edible Parts: Fruit Leaves Edible Uses: Fruit - raw or cooked[61, 177]. Sweet and juicy[11, 183], it is very nice in small quantities[K]. Very seedy[105]. The skin is rather tough and unpleasant, but the pulp is delicious with a custard-like texture[K]. This fruit gained very high marks from a group of 7 people in a fruit-tasting visit to various gardens[K]. The fruit is about 2cm in diameter[200]. Young leaves - cooked[105, 177, 183].
 tcanta Wood Wood - very hard and heavy. Used for mallets etc[151].
 nrakta E. Asia - China. ksacta Thickets, 1200 - 2200 metres[109].
 propta Seed - best sown as soon as it is ripe in a cold frame or in an outdoors seedbed if there is sufficient seed[80, 113]. The seed must be separated from the fruit flesh since this contains germination inhibitors[80, 164]. Stored seed should be cold stratified for 3 - 4 months and sown as early as possible in the year[164]. Scarification may also help as may a period of warm stratification before the cold stratification[80, 164]. Germination, especially of stored seed, can be very slow, taking 18 months or more[164]. Prick out the seedlings of cold-frame sown seeds into individual pots as soon as they are large enough to handle and grow the plants on for their first winter in a greenhouse, planting out in the spring after the last expected frosts. Cuttings of half-ripe side shoots, July/August in a frame[188]. Cuttings of mature wood of the current year's growth, taken with a heel if possible, autumn in a cold frame. High percentage[78]. Layering of new growth in June/July. Takes 9 months[78].
 nwatta An easily grown plant, it succeeds in any soil of good or moderate fertility[1], ranging from acid to shallow

chalk[200]. Does not like chalky soils according to other reports[184, 188]. Grows well in heavy clay soils. Prefers a rich well-drained loamy soil and a position that is at least partially sunny[11]. A very ornamental plant[1], it is hardy to about -20°C[184]. A number of named forms have been developed for their ornamental value[182]. Plants are slow-growing when young, they speed up somewhat after a few years but then soon slow down again[202]. This sub-species of *C. kousa* grows more freely, flowering and fruiting better in Britain though it barely differs in appearance from the species[11]. Plants in this genus are notably resistant to honey fungus[200].

6.2.6 *Crataegus pennsylvanica*

5 tlin 9 cyuc 5 kcaak 0 tcan 2 dwat 9 m hkuc
 hmimhtut cyutli hgattcuphja 7n hwicli hrasjlutnyikfrp hpa 7tli flatprikwlislp hpa 7tmwatli xre 7t hjonli
 drutta *Crataegus pennsylvanica* is a deciduous Tree growing to 9 m (29ft 6in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.
 kcaaka Fruit - raw or cooked. A very good size fruit, up to 25mm in diameter, with a lovely semi-sweet flavour even when semi-ripe, it makes a delicious dessert[K]. It is also sometimes made into jellies[82] and can be dried for later use. The fruit is borne in clusters of 4- 12 and is very easily harvested[82, K]. There are up to five fairly large seeds in the centre of each fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].
 tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].
 dwatta Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].
 nrakta Eastern N. America - Delaware to Pennsylvania and W. Virginia. ksacta Open woods and thickets in moist fertile soils[43]. Meadows in low, moist soils[82].
 propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.
 nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well

on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. This species has a good potential as a fruit crop in Britain. It regularly produces heavy crops of high quality, the tree is very easily grown and is little troubled by pests or diseases. It also requires very little attention, once the trees are established virtually the only work needed is to harvest the fruit each year[K]. A tree about 5 metres tall and wide at Kew fruits regularly and very heavily[K]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

6.2.7 Amelanchier laevis

Allegheny Shadberry, Allegheny serviceberry, Smooth Serviceberry

5 tlin 8 cyuc 5 kcaok 2 tcan 1 dwat 9 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyikfrrip hpa7tli frusflat-
prik hpa7tmwatli fyfxre7t hjonli

drutta Amelanchier laevis is a deciduous Shrub growing to 9 m (29ft) by 6 m (19ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from April to May, and the seeds ripen from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Edible fruit - raw or cooked[2, 11, 105, 159]. Succulent and sweet[82, 183]. This is one of the nicest fruits in the genus, it can be eaten and enjoyed in quantity[K]. The fruit can also be dried for winter use[183]. Up to 18mm in diameter[200]. The fruit is rich in iron and copper[226].

tcanta Miscellany WoodWood - heavy, exceedingly hard, strong, close grained. Used for tool handles etc[82].

dwatta MiscellanyAn infusion of the bark was used by expectant mothers[257].

nrakta Eastern N. America. Naturalized in Britain. ksacta Dry to moist thickets, woodland edges and edges of swamps in cool ravines and on hillsides[43, 82]. Naturalized in Britain on light acidic soils[17].

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nnwatta Landscape Uses:Firewood, Specimen, Woodland garden. Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not too dry or water-logged[11]. Grows well in heavy clay soils. Found in the wild on light acidic soils[17]. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible

ornamentals, this species is worthy of special attention because of the quality of its fruit. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. Trees come into bearing in about 12 years from seed[98]. Considerable confusion has existed between this species and *A. arborea*, *A. canadensis* and *A. lamarckii*, see [11] for the latest (1991) classification. It hybridizes with *A. sanguinea*, *A. huronensis*, *A. wiegandii*, *A. stolonifera*, *A. canadensis*, *A. arborea* and *A. bartramiana*. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1]. Special Features:Attracts birds, North American native, Attracts butterflies, Blooms are very showy.

6.2.8 Crataegus arnoldiana

Arnold Hawthorn

5 tlin 9 cyuc 5 kcaok 0 tcan 2 dwat 7 m hkuc
hmimhtut cyutli hgatkyuctcuphja7n hwicli hrasljutnyikfrrip
hpa7tli flatprikhwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus arnoldiana* is a deciduous Tree growing to 7 m (23ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in very alkaline soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[105, 177]. Sub-acid[82]. A delicious flavour, it is sweet with a soft juicy flesh and makes an excellent dessert fruit[K]. It can also be cooked and used in pies, preserves etc and can be dried for later use. The fruit ripens in early September in southern Britain[K]. The fruit is about 2cm in diameter[K]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta North-eastern N. America - Massachusetts and Connecticut. ksacta Wooded banks[43]. Thickets on a dry bank[82].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nawta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. This is a tree with an excellent potential as a fruit crop in Britain. The fruit is of very good quality and is freely borne, whilst the tree is of very easy cultivation and rarely troubled by pests or diseases[K]. A tree at the Hillier Arboretum in September 1993 was about 3 metres tall and 1.5 metres wide. The growth looked somewhat weak and the tree was leaning due to wind rock but it was carrying a heavy crop of fruit[K]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. A very ornamental plant[1], it is very closely related to *C. mollis*, and considered to be part of that species by many botanists[229]. Hybridizes freely with other members of this genus[200]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

6.2.9 *Crataegus schraderana*

Blue hawthorn

5 tlin 9 cyuc 5 kcaak 0 tcan 2 dwat 6 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnykfrp hpa7tli
flatprkiwslip hpa7tmwatli xre7t hjonli

drutta *Crataegus schraderana* is a deciduous Tree growing to 6 m (19ft 8in). It is not frost tender. It is in flower in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcaakta Fruit - raw or cooked[74]. A reasonable size, about 15 - 20mm in diameter[K]. This is one of the nicest tasting fruits of the genus I have tried to date. When fully ripe it is juicy with an extremely pleasant flavour and almost literally melts in the mouth[K]. I would far rather eat this fruit than a strawberry[K]. It ripens in late September and hangs on the tree in good condition for at least 4 weeks[K]. The ripe fruit is so soft that it is best eaten fresh from the tree[K]. The fruit can also be used in making pies, preserves etc, and can be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta S. Europe - Greece. ksakta Mountainous areas[50].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting

the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nawta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. This species has an excellent potential as a fruit crop in Britain. The fruit is about the size of a cherry, it is very freely borne and the best forms are of excellent dessert quality[K]. The tree is very easily grown and is little troubled by pests or diseases. It also requires very little attention, once the trees are established virtually the only work needed is to harvest the fruit each year[K]. Grafted specimens can produce fruit in their third year[K]. A very ornamental plant[74], it grows well in Britain flowering and fruiting well at Kew and Wisley[K]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Hybridizes freely with other members of this genus[200]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

6.2.10 *Crataegus ellwangeriana*

Scarlet Hawthorn

5 tlin 7 cyuc 5 kcaak 2 tcan 2 dwat 6 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnykfrp hpa7tli
flatprkiwslip hpa7tmwatli xre7t hjonli

drutta *Crataegus ellwangeriana* is a deciduous Tree growing to 6 m (19ft) by 6 m (19ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcaakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked. Juicy and acid[82]. An excellent dessert fruit, it has an acid yet sweet flavour, is juicy but with a mealy texture, it makes very pleasant eating[K]. The fruit can also be used in making pies, preserves etc, and can be dried for later use. A reasonable size, it is about 15mm in diameter[200]. A specimen at Kew has fruits up to 25mm in diameter[K]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as

as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern N. America. ksacta Not known in the wild, it is possibly of hybrid origin.

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. This species is possibly of hybrid origin, involving *C. pedicellata*, though some botanists view it as no more than part of *C. pedicellata*[82]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A very ornamental plant[11].

6.2.11 *Prunus insititia*

Damson

5 tlin 9 cyuc 5 kcaak 3 tcan 1 dwat 6 m hkuc
hmmihtut cyutli tcup hwicli hrasj|lutnyikfrip hpa7tli flatprikli-
wis hpa7tmwatli xre7t hjonli

drutta *Prunus insititia* is a deciduous Tree growing to 6 m (19ft) by 5 m (16ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in April, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

ksakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw or cooked[1, 2, 46]. More acid than a plum but it is very acceptable raw when fully ripe, especially after being touched by frost[12, 34, K]. The fruit is about 3cm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

taanta Dye Hedge Hedge Shelterbelt A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Trees are fairly wind resistant and can be grown as a shelterbelt hedge[200].

dwatta Febrifuge Purgative Styptic The bark of the root and branches is febrifuge and considerably styptic[4]. An infusion of the flowers has been used as a mild purgative for children[4]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta S. W. Asia. Naturalized and often considered a native of Britain. ksacta Thickets, hedges and open woods[4, 17].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Requires a well-drained moisture retentive soil[1, 11]. Succeeds in light shade but fruits better in a sunny position[11, 200]. Thrives in a loamy soil, doing well on limestone[11]. Grows well in heavy clay soils. Prefers some chalk in the soil but apt to become chlorotic if too much is present[1]. Occasionally cultivated for its edible fruit, there are some named varieties[200]. It has been derived in cultivation from the bullace, differing in having a sweeter fruit[200]. Damsons can be grown successfully against a north facing wall[219]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. *Prunus insititia* L. is a synonym of *Prunus domestica* subsp. *insititia* (L.) Bonnier and Layens. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2].

6.2.12 *Prunus persica*

Peach, Flowering Peach, Ornamental Peach, Common Peach
5 tlin 9 cyuc 5 kcaak 3 tcan 3 dwat 6 m hkuc
htut cyutli tcup hwicli hrasj|lutnyik hpa7tli flatprikliwis
hpa7tmwatli fyfixre7t hjonli

drutta *Prunus persica* is a deciduous Tree growing to 6 m (19ft) by 6 m (19ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in April, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista The seed can contain high levels of hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is readily detected by its bitter taste. Usually present in too small a quantity to do any harm, any very bitter seed or fruit should not be eaten[65]. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

ksakta Edible Parts: Flowers Fruit Oil Oil Seed Edible Uses: Gum Oil Oil Tea Fruit - raw, cooked or dried for later

1, 2, 34, 46]. The fruit is often used in ice creams, pies, jams etc[183]. When fully ripe, the fruit of the best forms are very juicy with a rich delicate flavour[K]. Wild trees in the Himalayas yield about 36.5kg of fruit a year[194]. The fruit of the wild form contains about 5.2% sugars, 2% protein, 1.6% ash. Vitamin C content is 2.3mg per 100g[194]. The fruit is a good source of vitamin A[201]. Fruits of the wild peach are richer in nutrients than the cultivated forms[194]. The size of fruit varies widely between cultivars and the wild form, it can be up to 7cm in diameter and contains one seed[200]. Flowers - raw or cooked. Added to salads or used as a garnish[183]. They can also be brewed into a tea[183]. The distilled flowers yield a white liquid which can be used to impart a flavour resembling the seed[183]. Seed - raw or cooked. Do not eat if it is too bitter, seed can contain high concentrations of hydrocyanic acid. See the notes above on toxicity. A semi-drying oil is obtained from the seed[57]. Although the report does not mention edibility it can be assumed that it is edible. The seed contains up to 45% oil[218]. A gum is obtained from the stem. It can be used for chewing[64].

tcanta Adhesive Cleanser Dye Gum Oil OilA green dye can be obtained from the leaves[168]. Yellow according to another report[257]. A dark grey to green dye can be obtained from the fruit[168]. A semi-drying oil is obtained from the seed[57]. It is used as a substitute for almond oil in skin creams[238]. The bruised leaves, when rubbed within any container, will remove strong odours such as garlic or cloves so long as any grease has first been fully cleaned off[4]. A gum obtained from the stem is used as an adhesive[64].

dwatta Alternative Anthelmintic Antiasmthmatic Antihalitosis Antihalitosis Astrigent Demulcent Diuretic Emollient Expectorant Febrifuge Haemolytic Laxative Sedative Vitamin C Antihalitosis[194]. The leaves are astringent, demulcent, diuretic, expectorant, febrifuge, laxative, parasiticide and mildly sedative[21, 218]. They are used internally in the treatment of gastritis, whooping cough, coughs and bronchitis[238]. They also help to relieve vomiting and morning sickness during pregnancy, though the dose must be carefully monitored because of their diuretic action[21]. The dried and powdered leaves have sometimes been used to help heal sores and wounds[21]. The leaves are harvested in June and July then dried for later use[4]. The flowers are diuretic, sedative and vermifuge[4, 21, 176, 194, 218]. They are used internally in the treatment of constipation and oedema[238]. A gum from the stems is alterative, astringent, demulcent and sedative[4, 21, 176, 194, 218]. The seed is antiasthmatic, antitussive, emollient, haemolytic, laxative and sedative[4, 21, 176, 194, 218]. It is used internally in the treatment of constipation in the elderly, coughs, asthma and menstrual disorders[238]. The bark is demulcent, diuretic, expectorant and sedative[4]. It is used internally in the treatment of gastritis, whooping cough, coughs and bronchitis[238]. The root bark is used in the treatment of dropsy and jaundice[218]. The bark is harvested from young trees in the spring and is dried for later use[4]. The seed contains 'laetrile', a substance that has also been called vitamin B17[218]. This has been claimed to have a positive effect in the treatment of cancer, but there does not at present seem to be much evidence to support this[K]. The pure substance is almost harmless, but on hydrolysis it yields hydrocyanic acid, a very rapidly acting poison - it should thus be treated with caution[218]. In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta E. Asia - China. ksacta Not known in a truly wild situation, it is possibly derived in cultivation from *P. davidiana*.

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. The stored seed is best given 2 months warm followed by 3 months cold stratification[113]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. A very low percentage[113]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Landscape Uses:Container, Espalier, Firewood.

Requires a well-drained moisture retentive soil[1, 11]. Thrives in a loamy soil, doing well on limestone[11]. Best not grown in acid soils. Prefers some chalk in the soil but it is apt to become chlorotic if too much is present[1]. Prefers a pH in the range 6 to 7[200]. Succeeds in light shade but fruits better in a sunny position[11]. Requires shelter from north and north-east winds[11] and also from spring frosts[200]. Widely cultivated for its edible fruit in warm temperate areas and continental climates, there are many named varieties[183]. There are numerous divisions of the varieties according to skin colour etc. Perhaps the most useful from the eaters point of view is whether it is free-stone (the flesh parts easily from the seed) or cling-stone (the flesh adheres to the seed)[200, K]. Trees are normally hardy in southern Britain[11], tolerating temperatures down to about -20°C when they are dormant[184], but they require some protection if cropping is to be at all reliable[11]. This is not due so much to lack of cold hardiness, more to the cooler summers in Britain which do not fully ripen the wood and the fruit, plus the unpredictable winters and springs which, in a mild spell, can excite the tree into premature flowering and growth which is then very liable to damage in any following cold spell. Hand pollination at this time can improve fruit-set[200]. The cultivar 'Rochester' is more likely than most cultivars to succeed outdoors in Britain[200]. In general it is best to site peaches in a very warm sheltered sunny position, preferably against a south or west facing wall[200, 219]. Most cultivars are self-fertile[200]. Trees are often grafted onto plum or other rootstocks but are said to be better when grown on their own roots in southern Britain[11]. Trees are not generally long-lived[200], this is partly because of the need for the tree to produce a constant supply of new wood since most fruit is formed on one-year old wood (though some fruit spurs are formed)[200]. Garlic is a good companion for this plant, helping to prevent disease, especially peach leaf curl[20, 201]. Tansy grown below peach trees helps to keep them healthier[201]. Peach leaf curl can also be prevented by protecting the plants from winter and early spring rains, perhaps by covering them in plastic[200]. Plants grown or overwintered indoors do not suffer from leaf curl[260]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Edible, Not North American native, All or parts of this plant are poisonous, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is flat with shallow roots spreading near the soil surface. The root pattern is suckering with new plants from runners away from the plant [2-1].

6.2.13 *Prunus domestica italica*

Gages, Greengage

5 tlin 8 cyuc 5 kcac 2 tcan 2 dwat 5 m hkuc

hmimhtut cyutli tcup hwicli hrasjlutnykifrip hpa7tli flatprikli-wisslip hpa7tmwatli hjonli

drutta *Prunus domestica italica* is a deciduous Tree growing to 5 m (16ft) by 4 m (13ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6. The flowers are pollinated by Bees, Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils.

It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Flowers Fruit Oil Seed **Edible Uses:** Oil Fruit - raw or cooked. Often considered to be the finest of the dessert plums, they have a delicious flavour [K]. The greengages. The usually green, globose fruit is usually 30 - 400mm in diameter. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity. An edible gum is obtained from points of damage on the trunk [64]. The seed contains about 20% of an edible semi-drying oil [4, 57]. It has an agreeable almond smell and flavour [4]. The flowers are eaten. They are used as a garnish for salads and ice cream or brewed into a tea [183].

tcanta Adhesive Cosmetic Dye Oil Wood A green dye can be obtained from the leaves [168]. A dark grey to green dye can be obtained from the fruit [168]. A yellow dye is obtained from the bark [115]. A gum obtained from points of damage along the stem can be used as an adhesive [64]. The ground up seeds are used cosmetically in the production of face-masks for dry skin [7]. A semi-drying oil is obtained from the seed [64]. No details of its uses. The reddish-brown wood is very close-grained, hard, compact. Liable to warp and split. It is used for musical instruments [115, 146].

dwatta Digestive Febrifuge Laxative Purgative Stomachic Styptic The dried fruit, known as prunes, is a safe and effective laxative and is also stomachic [4, 7, 21, 238]. The bark is sometimes used as a febrifuge and is styptic [4, 7]. An infusion of the flowers has been used as a mild purgative for children [4]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being [238].

nrakta A cultivated plant, not known in the wild. **ksacta** Not known in a truly wild situation

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe [200]. Sow stored seed in a cold frame as early in the year as possible [200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate [113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. The various cultivars of plum are unlikely to breed true (though the green forms of the gage generally do) - they will usually produce a range of plants from seed with differing characteristics from their parent. Cuttings of half-ripe wood with a heel, mid-summer in a frame [11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame [200]. Layering in spring.

nwatta The greengages are a group of cultivars of the common European plum. Gages are often cultivated as a fruit crop, especially in western Europe. Of excellent quality, though their delicate skins makes it difficult to get them to market in good condition and so they are more likely to be grown on a garden scale or be used for canning etc. *Prunus domestica* subsp. *italica* requires a well-drained moisture retentive soil [1, 11]. Succeeds in light shade but fruits better in a sunny position [11, 200]. Thrives in a loamy soil, doing well on limestone [11]. Grows well in heavy clay soils. Prefers some chalk in the soil but apt to become chlorotic if too much is present [1]. The various gages are often cultivated for their edible fruits, especially on a garden scale. There are some named varieties [200]. The gage was first developed from the plum in the Middle East, later spreading via France into much of western Europe. Its cultivation has spread into most temperate regions, though it is often only grown on a small scale because of the difficulty

of getting it to market in good condition. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged [238]. Plants in this genus are notably susceptible to honey fungus [200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is flat with shallow roots spreading near the soil surface [2-1]. *Prunus domestica italica* is a deciduous shrub or a tree usually growing 2 - 6 metres tall, occasionally to 15 metres. We can infer from its cultivation that the species grows optimally in areas with cold winters and long warm summers as vernalisation is required for flowering. The species can tolerate frost, however, when this occurs after flowering the fruit quality is poor (Lim 2002). Widely grown cultivars include: Boddarts Reneclode (Germany), Bryanston (UK), Cambridge Gage (UK), Canerik (Turkey), Denniston's Superb (USA), Gojeh Sabz (Iran), Yasil Alça or Gök Alça (Azerbaijan), Golden Transparent (UK), Graf Althanns Reneklode (Germany), Green Vanilla (Mount Pelion, Greece), Große Grüne Reneklode (Germany) / Reine Claude Verte (France), Laxton's Gage (UK), Laxton's Supreme (UK), Meroldts Reneclode (Germany), Rainha Cláudia (Portugal), Regina Claudia (Italy), Reine Claude de Bavay (France), Reine Claude d'Oullins (France), Uhinks Reneklode (Germany), Washington (USA).

6.2.14 *Rubus fruticosus*

Blackberry, Shrubby blackberry
5 tin 9 cyuc 5 kcaac 2 tcan 3 dwat 3 m hkuc
pcimhmimhtic cyutli hqattuc hwicli hyishrasjlutnyik hpa7tli
fruslatprikhtwislip hpa7tmwlati fyifkre7t hjonli

drutta *Rubus fruticosus* is a deciduous Shrub growing to 3 m (9ft) by 3 m (9ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf from March to November, in flower from May to September, and the seeds ripen from July to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects, Apomictic (reproduce by seeds formed without sexual fusion). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid and very alkaline soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Fruit Leaves Root Shoots **Edible Uses:** Tea Fruit - raw or cooked [5, 7, 9, 12, 183]. The best forms have delicious fruits and, with a range of types, it is possible to obtain ripe fruits from late July to November [K]. The fruit is also made into syrups, jams and other preserves [238]. Some people find that if they eat the fruit before it is very ripe and quite soft then it can give them stomach upsets [K]. Root - cooked. The root should be neither too young nor too old and requires a lot of boiling [7]. A tea is made from the dried leaves [21] - the young leaves are best [61]. The leaves are often used in herbal tea blends [238]. Young shoots - raw. They are harvested as they emerge through the ground in the spring, peeled and then eaten in salads [244].

tcanta Dye Fibre Pioneer A purple to dull blue dye is obtained from the fruit [168]. A fibre is obtained from the stem and used to make twine [66]. Plants are spread by seed deposited in the droppings of birds and mammals. They often spring up in burnt-over, logged or abandoned land and make an excellent pioneer species, creating the right conditions for woodland trees to move in. The trees will often grow in the middle of a clump of blackberries, the prickly stems protecting them from rabbits [K].

dwatta Antidiarrhoeal Astringent Depurative Diuretic Dysentery Tonic Vulnerary The root-bark and the leaves are strongly astringent, depurative, diuretic, tonic and vulnerary [4, 7, 9, 165, 254]. They make an excellent remedy for dysentery, diarrhoea, haemorrhoids, cystitis etc, the root is the more astringent [4, 238]. Externally, they are used as a gargle to treat sore throats, mouth ulcers and gum inflammations [238, 254]. A decoction of the leaves is useful as a gargle in treating thrush and also makes a good general mouthwash [7].

nakra Europe, including Britain, to the Mediterranean and Macaronesia. ksacta A very common and adaptable plant, found in hedgerows, woodland, meadows, waste ground etc[17, 244].

propta Seed - requires stratification and is best sown in early autumn in a cold frame. Stored seed requires one month stratification at about 3°C and is best sown as early as possible in the year. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Cuttings of half-ripe wood, July/August in a frame[200]. Tip layering in July. Plant out in autumn. Division in early spring or just before leaf-fall in the autumn[200].

nwatta Easily grown in a good well-drained loamy soil[1, 11, 200]. Succeeds in acid and calcareous soils[186]. Tolerates poor soils[202]. Established plants are drought resistant[132]. Succeeds in sun or semi-shade[1, 11, 200], though it fruits less well in the shade[202]. Plants will also fruit when grown in fairly deep shade or against a north facing wall, though the fruit will ripen later[219]. Plants tolerate quite severe exposure[186]. Hardy to at least -18°C[202]. *R. fruticosus* is an aggregate species made up of several hundred slightly differing species. The reason for this is that most seed is produced by a non-sexual method (Apomixis) and is therefore genetically identical to the parent plant. On occasions when sexual production of seed takes place the offspring will all be slightly different from the parent plant and will then usually reproduce as a new species by means of apomixis. Modern treatment of this aggregate usually does not use the name *R. fruticosus* because of the confusion over which species it should apply to, the type species of the aggregate should be called *R. ulmifolius*[150]. The following members of the aggregate have been highly recommended for their fruit[150]. *R. badius*. *R. cyclophorus*. *R. gratus*. *R. memorialis*. *R. oxyanchus*. *R. pyramidalis*. *R. separinus*. *R. winteri*. The following members are said to be nearly as good. *R. balfourianus*. *R. broensis*. *R. carpinifolius*. *R. foliosus*. *R. fuscoviridis*. *R. infestus*. *R. insericatus* newbouldianus. *R. koehleri*. *R. largificus*. *R. londinensis*. *R. ludensis*. *R. macrophyllus*. *R. obscurus*. *R. pseudo-bifrons*. *R. rhombifolius*. *R. riddelsdellii*. *R. scaber*. *R. thyrsoiflorus*. *R. vallisparvus*. *R. vestitus*. Plants form dense thickets and this makes excellent cover for birds[186]. They regenerate freely after being cut back[186]. This species is also a good plant for bees and butterflies[24]. This species has biennial stems, it produces a number of new stems each year from the perennial rootstock, these stems fruit in their second year and then die[200]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

6.2.15 *Allium ampeloprasum*

Wild Leek, Broadleaf wild leek

5 tlin 9 cyuc 5 kcaak 2 tcan 3 dwat 1.8 m hkuc
htut cyutli kyuctup hwicli hrasjlutnykrip hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

drutta *Allium ampeloprasum* is a BULB growing to 1.8 m (6ft) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf from October to August, in flower from July to August, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

ksakta Edible Parts: Flowers Leaves RootEdible Uses: Bulb - raw or cooked[2, 27, 61, 105]. The small bulbs can vary considerably in size from 2 - 6cm[200], they have a fairly strong leek to garlic flavour and are nice as a flavouring in cooked foods[K]. The bulbs of selected cultivars are very large with a mild garlic flavour[183]. Leaves - raw or cooked[2]. A pleasant mild to strong garlic flavour, they are available from late autumn to the spring though they can become rather tough and fibrous as they get older[K]. Flowers - raw. A similar flavour to the leaves but they have a somewhat dry texture and are best used as a flavouring in cooked foods[K]. The bulbils have a mild garlic flavour and make a nice flavouring in salads and cooked foods. Although produced abundantly, they are quite fiddly to use because they are small[K]. They can also be pickled[142].

tcanta RepellentThe juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20].

dwatta Anthelmintic Antiasthmatic Anticholesterolemic Antiseptic Antispasmodic Cholagogue Diaphoretic Diuretic Expectorant Febrifuge Stimulant Stings Stomachic Tonic VasodilatorThis species has the same medicinal virtues as garlic, but in a much milder and less effective form[238]. These virtues are as follows:- Garlic has a very long folk history of use in a wide range of ailments, particularly ailments such as ringworm, Candida and vaginitis where its fungicidal, antiseptic, tonic and parasitocidal properties have proved of benefit[218]. It is also said to have anticancer activity[218]. Daily use of garlic in the diet has been shown to have a very beneficial effect on the body, especially the blood system and the heart. For example, demographic studies suggest that garlic is responsible for the low incidence of arteriosclerosis in areas of Italy and Spain where consumption of the bulb is heavy[222]. The bulb is said to be anthelmintic, antiasthmatic, anticholesterolemic, antiseptic, antispasmodic, cholagogue, diaphoretic, diuretic, expectorant, febrifuge, stimulant, stomachic, tonic, vasodilator[4, 9, 14, 21, 46, 165]. The crushed bulb may be applied as a poultice to ease the pain of bites, stings etc[4, 9, 14, 21].

nakra S. Europe to W. Asia. Possibly native in Britain in S.W. England and Wales[17]. ksacta Rocky places near the coast in S.W. England and Wales[17].

propta Seed - best sown as soon as it is ripe in a cold frame, though it can also be sown in a cold frame in the spring[200]. Prick out the seedlings into individual pots when they are large enough to handle. Well-grown plants can be planted out into their final positions in late summer or the autumn, otherwise grow them on for a further year in pots and plant them out the following summer. Division in late summer or early autumn. Dig up the bulbs when the plants are dormant and divide the small bulblets at the base of the larger bulb. Replant immediately, either in the open ground or in pots in a cold frame. Bulbils - plant out as soon as they are ripe in late summer. The bulbils can be planted direct into their permanent positions, though you get better results if you pot them up and plant them out the following spring.

nwatta Prefers a sunny position in a light well-drained soil[1]. Prefers a dry position[45]. Succeeds in clay soils[203]. Tolerates a pH in the range 5.2 to 8.3. The bulbs should be planted fairly deeply[1]. The wild leek is a rare native of Britain, found only in the south-west and Wales, though it should be hardy in most parts of the country. It comes into growth in the autumn, dying down in the summer, and makes a very pleasant winter leaf, either raw or cooked. It is a rather variable plant, especially in the amount of flowers and bulbils produced. The species produces mainly flowers with almost no bulbils, whilst the sub-species *A. ampeloprasum babbingtonii* (Babbington's Leek) produces lots of bulbils and almost no flowers[17]. The cultivated leek (*A. ampeloprasum porrum*) is believed to have been developed from this plant whilst, in Germany and Italy, other forms have been selected for their edible bulbils[142]. *Allium ampeloprasum* comprises several vegetables, of which the most important ones are: leek, elephant garlic or great-headed garlic, pearl onion, kurrat, Egyptian leek or salad leek, and Persian leek (*Allium ampeloprasum* ssp. *persicum*). The cultivar 'Perizweibel' is often used, the bulbils are solid rather than made up of layers and are popularly used for making pickles[183]. This cultivar does not set seed[183]. Another cultivated form of this plant produces very large, mild-garlic flavoured bulbs that are up to 500g in weight[183]. They are

known as elephant garlic[183]. The wild leek grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

6.2.16 *Ribes x culverwellii*

Jostaberry

5 tlin 9 cyuc 5 kcak 0 tcan 0 dwat 1.8 m hkuc
hmtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikliwis
hpa7tmwatli fyifxre7t hjonli

drutta *Ribes x culverwellii* is a deciduous Shrub growing to 1.8 m (6ft). See above for USDA hardiness. It is hardy to UK zone 6. It is in leaf from April to October, in flower from April to May, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked in pies, jams etc[200]. Intermediate in size and flavour between gooseberries and blackcurrants, tasting more like a gooseberry when under-ripe and more like a blackcurrant when fully ripe[K]. The fruit is rich in vitamin C[183].

nrakta A range of garden hybrids. ksacta Not known in the wild.

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 3 months cold stratification at between 0 and 5°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. This plant is a cultivar and will not breed true from seed. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. Best grown on a deep sandy loam[1]. Dislikes very heavy clay, chalky soils and thin dry soils, but it can succeed on most soil types if plenty of organic matter is incorporated[1]. Quite tolerant of shade though not fruiting so well in such a position[11]. A group of cultivars of hybrid origin, basically a cross between blackcurrants and gooseberries. Very vigorous plants, producing prolific crops of fruit. They are being grown increasingly in gardens. In general they resist American gooseberry mildew, blackcurrant leaf spot and gall mite. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multi-stemmed with multiple stems from the crown [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

6.2.17 *Allium cernuum*

Nodding Onion, New Mexican nodding onion

5 tlin 9 cyuc 5 kcak 2 tcan 2 dwat 0.5 m hkuc
htut cyutli hgattcup hwicli hrasljutnyik hpa7tli flatprikliwis
hpa7tmwatli xre7t hjonli

drutta *Allium cernuum* is a BULB growing to 0.5 m (1ft 8in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf from February to December, in flower from June to July.

The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought. The plant can tolerate maritime exposure.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves RootEdible Uses: Bulb - raw or cooked[2, 22, 161]. Strongly flavoured[46, 61, 159], it is mainly used as a flavouring[183, K]. The bulb is about 50mm tall and 15mm wide[235]. Leaves - raw or cooked[62, 85, 159]. A delicious, strong-onion flavour, they are very nice in salads[K]. The leaves are available from spring until the autumn and are one of the most favourite onions we are growing on our Cornish trial grounds[K]. Flowers - raw or cooked. A delicious strong onion flavour, somewhat stronger than the leaves especially if the seeds are starting to set[K]. They make a very decorative and tasty addition to the salad bowl[K].

tcanta RepellentThe juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20]. The juice can be applied to exposed skin in order to repel biting insects[257].

dwatta Lithontripic PoulticeThe whole plant has mild medicinal activity similar to the action of garlic (*Allium sativum*)[222]. It is used specifically as a poultice on the chest for the treatment of respiratory ailments and the juice has been used in the treatment of kidney stones[222]. The juice of the plant is used in treating colds, croup, sore throats etc[257]. A poultice of the plant is applied externally to various infections such as sore throats, sores, swellings, chest and pleurisy pains[257].

nrakta N. America - Canada to Mexico. ksacta Ledges, gravels, rocky or wooded slopes and crests ascending to high altitudes[43]. Widely distributed on moist soils in mountainous and cool regions to 3500 metres[270].

propta Seed - sow spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle - if you want to produce clumps more quickly then put three plants in each pot. Grow them on in the greenhouse for at least their first winter and plant them out into their permanent positions in spring once they are growing vigorously and are large enough. Division in spring. Very easy, the plants divide successfully at any time in the growing season and the divisions can be planted straight out into their permanent positions if required.

nwatta An easily grown plant[203], it prefers a sunny position in a light well-drained soil[1]. Succeeds in clay soils[203]. Established plants are fairly drought tolerant[190]. Plants succeed in maritime gardens[233]. A very ornamental plant, it makes a very decorative edging to flower beds[K]. This species is self-sowing quite freely in our Cornwall garden[K]. The bulbs should be planted fairly deeply[1]. Most members of this genus are intolerant of competition from other growing plants[203], though this species has tolerated considerable neglect in our Cornwall garden[K]. The cultivar 'Major' is a more vigorous form with larger flower clusters[90]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. A widespread and very variable species[1]. It is closely allied to *A. stellatum*[1, 270]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

6.2.18 *Allium fistulosum*

Welsh Onion

5 tlin 9 cyuc 5 kcak 2 tcan 2 dwat 0.6 m hkuc
htut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikliwis
hpa7tmwatli xre7t hjonli

drutta Allium fistulosum is a BULB growing to 0.6 m (2ft) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves RootEdible Uses: Bulb - raw or cooked[2]. A strong onion flavour, it can be used in salads, as a cooked vegetable or as a flavouring in cooked foods[22, K]. The bulbs are rather small, usually 10 - 25mm in diameter though they can be up to 45mm[266], and are sometimes used as spring onions[183]. A nutritional analysis is available[218]. Leaves - raw or cooked[2]. They have a mild onion flavour[183] and can be added to salads or cooked as a vegetable[116]. The leaves are often available all through the winter if the weather is not too severe[K]. They contain about 1.4% protein, 0.3% fat, 4.6% carbohydrate, 0.8% ash, some vitamin B1 and moderate levels of vitamin C[179]. Flowers - raw. A pleasant onion flavour, but they are rather on the dry side[K].

tcanta RepellentThe juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20].

dwatta Antibacterial Antifungal Antipyretic Diuretic Expectorant Stomachic Vitamin CThe bulb contains an essential oil that is rich in sulphur compounds[283]. It is antibacterial, antiseptic, diaphoretic, diuretic, galactagogue, stomachic, vermifuge and vulnerary[176, 218]. It is used in the treatment of colds and abdominal coldness and fullness[176]. A tea made from the roots is a children's sedative[218]. Use of the bulb in the diet impedes internal parasites[218]. Externally, the bulb can be made into a poultice to drain pus from sores, boils and abscesses[254].

nrakta E. Asia, possibly western China, though the original habitat is obscure. ksakta Cultivated for over 1000 years, it is not known in the wild.

propta Seed - sow spring in a greenhouse. The seed germinates over a wide range of temperatures, it is faster at higher temperatures[206]. Prick out the seedlings into individual pots when they are large enough to handle. When well-grown, the plants should be ready to be planted out in the summer. If they are not large enough at this time, grow them on in the greenhouse for their first winter and plant them out in late spring. Division of the plants is very easy and can be done at almost any time of the year though the spring is probably best. The divisions can be planted out straight into their permanent positions if required.

nwatta An easily grown plant[203], it prefers a sunny position in a light well-drained soil[1] but tolerates most soils[1, 52] including those that are damp and acid[203]. Prefers a pH in the range 6.5 to 7.5[206], but it tolerates a pH in the range 4.9 to 7.5. A very hardy species, it is related to the cultivated onion (*A. cepa*) and could be of value in breeding programmes. It is sometimes cultivated in the garden for its edible leaves which can be produced throughout the winter if the weather is not too severe[K]. A very popular cultivated vegetable in the Orient[206], it probably arose through cultivation from *A. altaicum*[203]. The oriental forms of this species, known as bunching onions, tend to be harder and more robust than the Welsh onion[206]. There are two basic forms, multi-stem types and single-stem types. The single-stem types divide less freely than the multi-stems[206]. Plants will often retain their leaves even when covered in snow[206]. They are also tolerant of high temperatures and can be grown in the tropics[206]. The plants are often eaten by slugs[K]. The bulbs should be planted fairly deeply[1]. Most members of this genus are intolerant of competition from other growing plants[203]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub

etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

6.2.19 Allium schoenoprasum

Chives, Wild chives, Flowering Onion

5 tlin 11 cyuc 5 kcaak 3 tcan 2 dwat 0.3 m hkuc
hmimhtut hpytli tcup hwicli hrasjlutnykifrip hpa7tli flatprikli-wisslip cya7tmwatli fyxfire7t hjonli

drutta Allium schoenoprasum is a BULB growing to 0.3 m (1ft) by 0.3 m (1ft in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from February to December, in flower from June to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in very large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcakta Edible Parts: Flowers Leaves RootEdible Uses: Leaves - raw, cooked or dried for later use. The leaves have a mild onion flavour and are an excellent addition to mixed salads, they can also be used as a flavouring in soups etc[2, 4, 5, 9, 27, 33]. The leaves are often available from late winter and can continue to produce leaves until early the following winter, especially if they are in a warm, sheltered position[K]. A good source of sulphur and iron[201]. A nutritional analysis is available[218]. The bulbs are rather small, and rarely exceed 10mm in diameter[200]. They can be harvested with the leaves still attached and be used as spring onions[K]. They have a pleasant mild onion flavour. The flowers can be used as a garnish in salads etc[183]. The flowers of this species are rather dry and less desirable than the flowers of many other species[K].

tcanta Fungicide RepellentLandscape Uses: Border, Container, Massing, Rock garden, Forest Garden. The juice of the plant is used as an insect repellent, it also has fungicidal properties and is effective against scab, mildew etc[14, 18, 20, 201]. The growing plant is said to repel insects and moles[14, 20, 200]. Dynamic accumulator. Ground cover.nectary, Ground Cover. Aromatic.

dwatta Appetizer Digestive Hypotensive TonicThe whole plant has a beneficial effect on the digestive system and the blood circulation. It improves the appetite, is digestive, hypotensive and tonic[201]. It has similar properties to garlic (*A. sativum*), but in a much milder form, and it is rarely used medicinally[238].

nrakta Most of Europe, including Britain, east to the Himalayas and Japan. ksakta Rocky pastures and damp meadows, preferring calcareous soils[17, 90].

propta Seed - sow spring in a cold frame. Germination is usually free and easy, pot up the seedlings as soon as they are large enough to handle easily and plant out in the following spring. Division can be carried out at almost any time of the year but is probably best done in spring. The clumps should be divided at least every 3 or 4 years in order to maintain vigour[200], the divisions can be planted out direct into their permanent positions.

nwatta An easily grown plant[203], it prefers a sunny position in a rich moist but well-drained soil[14, 37], though it succeeds in most soils[1, 37, 200] and also in light shade[203]. Grows well in heavy clay soils[203]. Tolerates a pH in the range 5.2 to 8.3. Chives are commonly cultivated in the garden for their edible leaves which are available from late winter to the beginning of the following winter[K]. The bulbs divide rapidly and large clumps are quickly formed. There are some named varieties[183, 200, 203]. Chives are very tolerant of heavy harvesting, regular cutting of the leaves ensures a continuous supply of young leaves and prevents the plants flowering[33]. Plants can be moved

into a frame or other protected environment in the autumn and will then produce leaves throughout the winter[33]. Do not do this every year or it weakens the plants. The bulbs should be planted fairly deeply[1]. A good bee plant[24]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. Helps to reduce the incidence of scab when it is grown under apple trees[201]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. Special Features: North American native, Edible, Fragrant foliage, Invasive, Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers, Fragrant flowers. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

6.2.20 *Carya illinoensis*

Pecan
5 tlin 9 cyuc 4 kcaek 2 tcan 1 dwat 50 m hku
htut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikhwisslip
hpa7tmwatli fyif hjonli

Carya illinoensis is a deciduous Tree growing to 50 m (164ft 1in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in leaf from June to October, in flower from April to May, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid and very alkaline soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Leaves Oil Seed Edible Uses: Milk Oil TeaSeed - raw or cooked[46, 82]. Sweet and delicious, they make an excellent dessert and are also often added to ice cream, used in cakes, bread etc[149, 183]. A milk can be made from the seed and is used to thicken soups, season corn cakes, hominy etc[183]. The seed is up to 4cm long and is produced in clusters of 3 -11[82, 229]. The seed ripens in late autumn and, when stored in its shell in a cool place, will keep for at least 6 months[K]. An edible oil is obtained from the seed[177, 183]. The leaves are said to be used as a tea[177, 183]. Carbon farming - Staple Crop: oil.

tcanta Fuel Oil Parasiticide WoodWood - coarse-grained, hard, heavy, brittle, not strong. It weighs 45 lb. per cubic foot. It is not as valuable a timber as other members of this genus and is used mainly for fuel and occasionally to make wagons and agricultural implements[46, 82, 227, 235]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwata Astringent Parasiticide TBThe bark and leaves are astringent[227]. A decoction of the bark has been used to treat TB[257]. The pulverized leaves have been rubbed on the skin to treat ringworm[257].

nrakta Southern N. America - mainly along the Mississippi river valley. ksacta Rich moist soils of bottomlands[229], especially along the sides of streams[235].

propta Seed - requires a period of cold stratification. It is best sown in a cold frame as soon as it is ripe[78]. Stored seed should be kept moist (but not wet) prior to sowing and should be sown in a cold frame as soon as possible[78]. Where possible, sow 1 or 2 seeds only in each deep pot and thin to the best seedling. If you need to transplant the seedlings, then do this as soon as they are large enough to handle, once more using deep pots to accommodate the tap root. Put the plants into their permanent positions as

soon as possible, preferably in their first summer, and give them some protection from the cold for at least the first winter[78, K]. Seed can also be sown in situ so long as protection is given from mice etc and the seed is given some protection from cold[200] (a plastic bottle with the top and bottom removed and a wire mesh top fitted to keep the mice out is ideal)

nwatta Global Crop Management: Standard Other Systems: Strip intercrop Staple Crop: OilLandscape Uses:Aggressive surface roots possible. Prefers a deep moisture-retentive loam in a sunny sheltered position, requiring a good summer for best development[1, 63, 137, 200]. Tolerates a pH in the range 4.5 to 8.3. Trees are fairly fast growing[200]. Trees do not grow very well in Britain, requiring hotter summers than are normally experienced here in order to fruit and fully ripen their wood[200]. However, a tree at Cambridge botanical gardens was 20 metres tall in 1985. Trees are said to be hardy to about -12°C, the same report also says that they are hardy to zone 5[200], which would experience considerably lower temperatures than this. Trees are probably much hardier when grown in areas with hot summers. In the wild, trees grow best in areas where summer temperatures average 24 - 30°C and the humidity is high[229]. Often cultivated for its edible seed, there are some named varieties[183]. Trees come into bearing when about 20 years old, the best period of production being between the ages of 75 to 225 years old[229]. Mature trees regularly give yields of 225 kilos, whilst yields of 450 kilos have been recorded[229]. A number of cultivars have been developed in N. America that succeed quite far north in that country[200]. These cultivars include: 'Carlson 3'. Early maturing, it is being trialled in Canada[183]. 'Devore'. An early fruiting form with small nuts that have an excellent flavour[183]. 'Gibson'. Precocious, protandrous, the nuts are of medium size with a good flavour[183]. 'Green Island'. Amongst the hardiest of cultivars, it has been selected for nut size, flavour and productivity[183]. 'Mullahy'. Hardy, precocious and very productive, it has ripened in Ontario[183]. Nuts are fairly large with an excellent flavour. 'Voiles 2'. Usually ripens as far north as Ontario and New York[183]. The wind-blown pollen is a significant cause of hay fever in the United States[274]. This species is the State Tree of Texas[274]. Plants are strongly tap-rooted and should be planted in their permanent positions as soon as possible[1, 137]. Sowing in situ would be the best method so long as the seed could be protected from mice[1, 200]. Trees are late coming into leaf (usually late May to June) and lose their leaves early in the autumn (usually in October)[137]. During this time they cast a heavy shade. These factors combine to make the trees eminently suitable for a mixed woodland planting with shrubs and other trees beneath them[137]. Plants in this genus are notably resistant to honey fungus[200]. Most species in this genus have quite a wide range of distribution and, in order to find trees more suited to this country, seed from the most appropriate provenances should be sought[137]. Most trees growing in Britain at present tend to only produce good seed after hot summers[137]. Trees are self-fertile but larger crops of better quality seeds are produced if cross-pollination takes place[229]. Special Features:North American native, Inconspicuous flowers or blooms. Carbon Farming - Climate: cold temperate subtropical, tropical highlands. Humidity: humid. Cultivation: global crop. Management: standard. Other Systems: strip intercrop. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

6.2.21 Vitis rotundifolia

Muscadine Grape, Muscadine, Southern Fox Grape, Scuppernong, Muscadine Grape

5 tlin 9 cyuc 4 kcaak 1 tcan 0 dwat 25 m hkuc
hmmihmtut cyutli kyuctup hwicli hrasjlutnyik hpa7tli flatprik-lwis hpa7tmwatli fyfxire7t hjonli

drutta Vitis rotundifolia is a deciduous Climber growing to 25 m (82ft 0in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from June to July, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

ksakta Edible Parts: Fruit Leaves Shoots Edible Uses: Fruit - raw or dried for winter use[1, 2, 22, 46]. Thick-skinned[61] with a pleasant musky flavour[11, 200, 219]. Pleasant to eat raw, the fruit is excellent in jellies, pies etc[183]. The fruit is up to 25mm in diameter[200] and is produced in small bunches[235]. Leaves - cooked[55]. Young leaves are wrapped around other foods and then baked, they impart a pleasant flavour. Young tendrils - raw or cooked[55, 85].

tcanta DyeA yellow dye is obtained from the fresh or dried leaves[168].

nrakta South-eastern N. America - Delaware to Indiana and Kansas, south to Florida, Texas and Mexico. ksakta Woods, thickets, sandhills and shores[43].

throcta Seed - best sown in a cold frame as soon as it is ripe[K]. Six weeks cold stratification improves the germination rate, and so stored seed is best sown in a cold frame as soon as it is obtained. Germination should take place in the first spring, but sometimes takes another 12 months. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter. Plant out in early summer. Cuttings of mature wood of the current seasons growth, December/January in a frame. These cuttings can be of wood 15 - 30cm long or they can be of short sections of the stem about 5cm long with just one bud at the top of the section. In this case a thin, narrow strip of the bark about 3cm long is removed from the bottom half of the side of the stem. This will encourage callusing and the formation of roots. Due to the size of these cuttings they need to be kept in a more protected environment than the longer cuttings. Layering.

nwatta Landscape Uses:Arbor. Prefers a deep rich moist well-drained moderately fertile loam[1, 200]. Grows best in a calcareous soil[200]. Succeeds in sun or partial shade though a warm sunny position is required for the fruit to ripen[200]. Prefers a position in full sun[160] Plants climb by means of tendrils[182]. They grow particularly well up elm trees[18]. Cultivated for its edible fruit in N. America[46, 61], there are some named varieties[183]. Most plants are self-fertile[160], but there are some cultivars that only produce female flowers and require pollination[183]. Any pruning should be carried out in winter when the plants are dormant otherwise they bleed profusely[182, 200]. Resistant to Phylloxera disease, a disease that almost destroyed the European grape crops. This species can be used as a root-stock in areas where the disease is prevalent and can also be used in breeding programmes with *V. vinifera* in order to impart resistance to that species[160]. Plants are, however, susceptible to infestation by aphids[160]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: North American native, Inconspicuous flowers or blooms. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Woody. Growth habit is a single or multiple shooting vine from a crown [1-2].

6.2.22 Sorbus torminalis

Wild Service Tree, Checkertree

5 tlin 9 cyuc 4 kcaak 2 tcan 0 dwat 20 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyikfrp hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta Sorbus torminalis is a deciduous Tree growing to 20 m (65ft 7in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista The seeds probably contain hydrogen cyanide. This is the ingredient that gives almonds their characteristic flavour. Unless the seed is very bitter it should be perfectly safe in reasonable quantities. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

ksakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[2, 5, 11, 74, 115, 183]. The taste is best after a frost because it turns sweeter. The fruit can also be blotted if it is going to be eaten raw[3, 183]. This involves storing the fruit in a cool dry place until it is almost but not quite going rotten. At this stage the fruit has a delicious taste, somewhat like a luscious tropical fruit. Rich in vitamin C. The fruit is up to 1.5cm across[200] and is borne in bunches which makes it easier to harvest[K].

tcanta WoodWood - heavy, fine grained, polishes well. Used for turning, wood carving[74, 115].

nrakta Europe, from Britain and Denmark south and east to N. Africa, the Caucasus and W. Asia. ksakta Woods, usually on clay[186], sometimes on limestone[17].

throcta Seed - best sown as soon as it is ripe in a cold frame[78, 80]. If you have sufficient seed it can be sown in an outdoor seedbed[78, 80]. Stored seed germinates better if given 2 weeks warm then 14 - 16 weeks cold stratification[98], so sow it as early in the year as possible. Prick out the seedlings into individual pots when they are large enough to handle. Seedlings are very slow to put on top-growth for their first year or two[11], but they are busy building up a good root system. It is best to keep them in pots in a cold frame for their first winter and then plant them out into their permanent positions in late spring.

nwatta Succeeds in most reasonably good soils so long as they are not too poor or acid, in an open sunny position[1, 11]. Prefers clay soils[3, 11]. Tolerates moderate shade[188], but does not fruit so well in such a position[K]. Grows best in the eastern half of Britain[121]. Plants are susceptible to fireblight[188]. Plants respond well to coppicing[186]. When found in a truly wild situation this species is considered to be an indication of primary woodland[200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

6.2.23 Pinus quadrifolia

Parry Piñon, Parry's Pinyon Pine, Four-leaved Pinyon

5 tlin 8 cyuc 4 kcaak 0 tcan 2 dwat 15 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjlut hpa7tli flatprik hpa7tmwatli dyat hjonli

drutta Pinus quadrifolia is an evergreen Tree growing to 15 m (49ft 3in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 8. It is in leaf all year, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].

ksakta Edible Parts: Seed Edible Uses: Condiment Seed - raw or cooked[1, 81, 161]. An important food crop for the In-

of Baja California[82, 183], the oil-rich seed has a mild resinous flavour and a pleasant soft texture. A good size, up to 16mm long[200]. The seed contains about 11% protein, 37% fat, 44% carbohydrate[183]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Adhesive Basketry Cosmetic Dye Fuel Herbicide Roofing WoodA tan or green dye is obtained from the needles[168]. The roots have been used to make baskets[257]. The bark has been used as a roofing material in houses[257]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. The pitch has been used as a face cream to prevent sunburn[257]. The pitch can be used as an adhesive on pottery etc[257]. Wood - light, soft, close grained[82]. It burns well and gives off a pleasant odour[257].

dwatta Antiseptic Diuretic Pectoral Poultice Rubefacient Vermifuge VulneraryThe turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge[4]. It is a valuable remedy used internally in the treatment of kidney and bladder complaints and is used both internally and as a rub and steam bath in the treatment of rheumatic affections[4]. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and TB[4]. Externally it is a very beneficial treatment for a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers[4].

nrakta South-western N. America - California. ksacta Arid mesas and low mountain slopes of lower California, to 1500 metres in the Santa Rosa mountains[82].

propta It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed[80]. Plant seedlings out into their permanent positions as soon as possible and protect them for their first winter or two[11]. Plants have a very sparse root system and the sooner they are planted into their permanent positions the better they will grow[K]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm[200]. We actually plant them out when they are about 5 - 10cm tall. So long as they are given a very good weed-excluding mulch they establish very well[K]. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Cuttings. This method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

nwatta Landscape Uses:Screen, Specimen. Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought, succeeding in a hot dry position[200]. This species is closely related to *P. cembraoides* and considered to be no more than a sub-species of it by some botanists[11]. The main difference is that this species has its leaves in bundles of four whilst *P. cembraoides* has them in bundles of two or three[200]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. It extensively hybridizes with *P. californiarum* in most of its range[200]. The cones open and shed their seed whilst still attached to the tree[226]. A slow growing tree, taking 25 years from sowing until it produces a crop of seeds[117]. The tree is long-

lived, taking 250 - 350 years to reach maturity[181]. Leaf secretions inhibit the germination of seeds, thereby reducing the amount of plants that can grow under the trees[181]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: North American native, Inconspicuous flowers or blooms.

6.2.24 *Pinus edulis*

Rocky Mountain Piñon, Twoneedle pinyon, Nut Pine, Pinyon Pine, Rocky Mountain Pinyon Pine, Singlelea
5 tin 8 cyuc 4 kcaak 3 tcan 2 dwat 15 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjlt hpa7tli frusflat-
prik hpa7tmwatli dyat hjonli

drutta *Pinus edulis* is an evergreen Tree growing to 15 m (49ft 3in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in leaf all year, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].

kcakta Edible Parts: Inner bark Seed SeedpodEdible Uses: Condiment Gum TeaSeed - raw or cooked[82, 177]. A slightly resinous flavour, but delicious raw or cooked[2, K]. The seed can be ground into a meal and used in stews, making bread, cakes etc and in making nut butter[183]. The seed is up to 25mm long[160]. Rich in oil, protein[183] and thiamine[160]. The seed contains about 15% protein[213]. An important item of food for the local Indians, it is also sold in local markets of Colorado and New Mexico[61, 82]. About 450,000 kilos of the seeds are sold in American markets each year[229]. The leaves can be brewed into a tea[183, 257]. Immature female cones - roasted. The soft centre forms a sweet syrupy food[183]. Inner bark - cooked. A sweet flavour, it is cut into strips and cooked like spaghetti[183]. Inner bark can also be dried, ground into a powder and used as a thickening in soups or can be mixed with cereal flours when making bread etc[257]. The pitch from the trunk can be hardened and used as a chewing gum[257]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Adhesive Dye Fuel Gum Herbicide Ink Paint Plaster Resin WoodA tan or green dye is obtained from the needles[168]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. This species yields a resin, but it is not commercially important. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. The gum (this almost certainly means the resin[K]) is used in waterproofing baskets, canoes etc, for repairing pottery vessels and in making turquoise mosaic[216, 257]. It has also been used as a red paint on jars and bowls[257]. For waterproofing containers, the gum was melted and poured inside the container. The container was then turned round to ensure the gum came into contact with all parts of the inside. More gum would then be applied to the outside[257]. The resin has been used as a glue for fixing turquoise in jewellery[257]. The gum has been used, with sumac leaves (*Rhus* spp) and yellow ochre to make a black dye and ink[257]. The sumac leaves are boiled until there is a strong mixture. Whilst the sumac was boiling, the ochre was powdered and roasted. The gum was then added to the ochre and the whole roasted again. As the roasting

proceeded, the gum melted and finally the mixture was reduced to a black powder. This was then cooled and thrown into the sumac mixture, forming a rich blue-black fluid that was essentially an ink[257]. Wood - light, soft, not strong, brittle. Used for fuel, fencing etc[61, 82]. A charcoal made from the wood is used in smelting[82]. The wood makes a good fuel, burning with few sparks being thrown out[257].

dwatta Antiseptic Depurative Diuretic Emetic Expectorant Pectoral Plaster Rubefacient VD VermifugeThe turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge[4]. It is a valuable remedy in the treatment of kidney, bladder and rheumatic affections, and also in diseases of the mucous membranes and the treatment of respiratory complaints[4]. Externally it is used in the form of liniment plasters and poultices on cuts, boils, burns and various skin problems[4, 257]. The heated pitch has been applied to the face to remove facial hair[257]. The gum is used as a plaster on cuts and sores[216]. An infusion of the leaves has been used as an emetic to cleanse the stomach[257]. The leaves have been chewed in the treatment of venereal diseases[257]. The leaves have been burnt and the smoke inhaled as a treatment for colds[257]. The inner bark is expectorant[257].

nrakta South-western N. America - Rocky mountains. ksacta Eastern foothills of the outer reaches of the Rockies on arid mesas in pure stands or with junipers[120].

propta It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed[80]. Plant seedlings out into their permanent positions as soon as possible and protect them for their first winter or two[11]. Plants have a very sparse root system and the sooner they are planted into their permanent positions the better they will grow[K]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm[200]. We actually plant them out when they are about 5 - 10cm tall. So long as they are given a very good weed-excluding mulch they establish very well[K]. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Cuttings. This method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

nwatta Management: Standard Staple Crop: Protein-oil Wild Staple CropLandscape Uses:Border, Erosion control, Massing, Screen, Specimen. Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. Succeeds in a hot dry position[200]. Prefers an acid soil in full sun[160]. A very hardy species, tolerating temperatures down to about -35°C when it is fully dormant[160]. A slow-growing but long-lived tree in the wild[185, 229], it takes about 25 years from seed before it produces seed[117]. It then produces good crops every 3 - 4 years[229]. The cones open and shed their seed whilst still attached to the tree[226]. Trees take about 250 - 350 years to reach full maturity[181]. This species is considered by some botanists to be no more than a form of *P. cembroides*, its main difference from that species is that it has leaves in bundles of two whereas *P. cembroides* usually has bundles of three[200]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. Leaf secretions inhibit the germination of seeds, thereby reducing the amount of plants that can grow below the tree[18]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information

on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. An evergreen. The root pattern is a tap root similar to a carrot going directly down [1-2].

6.2.25 *Acer saccharum grandidentatum*

Big-Tooth Maple, Canyon Maple, Rocky Mountain Sugar Maple

5 tlin 8 cyuc 4 kcaok 0 tcan 0 dwat 12 m hkuc
hmimhtut cyutil tcup hwicli hrasjlutnykifrip hpa7tli flatprikli-wis hpa7tmwatli hjonli

drutta *Acer saccharum grandidentatum* is a deciduous Tree growing to 12 m (39ft) by 8 m (26ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to May, and the seeds ripen in September. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcaakta Edible Parts: Inner bark Sap SeedEdible Uses: SweetenerThe sap is relatively rich in sugar and can be made into a drink or concentrated into a syrup by boiling off the water[1, 2, 11, 34, 57]. The syrup is used as a sweetener on many foods. It can be harvested in late winter or early spring[[142], the flow is best on a warm sunny day after a frost. Trees on southern slopes in sandy soils give the best yields. It is best to make a hole about 7cm deep and about 1.3 metres above the ground[171]. Yields of 40 - 100 litres per tree can be obtained[142]. The best sap production comes from cold-winter areas with continental climates. Seed - boiled then roasted[62, 105, 159]. The seed is about 6mm long and is produced in small clusters[82]. Inner bark cooked. It is dried, ground into a powder and then used as a thickening in soups etc or mixed with cereals when making bread[105, 161].

tcanta Fuel Preservative WoodThe leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. Wood - close grained, tough, hard, heavy. Used for furniture, ship building, etc[46, 61, 82, 171]. It is a good fuel.

nrakta Western N. America - Rocky Mountains. ksacta Found in moist sites such as wet canyons, valleys and the banks of mountain streams at elevations of 1200 - 2100 metres[229].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. A lot of the seed is non-viable, it is best to cut a few open to see if there is an embryo[113]. An average of 95% germination can be achieved from viable seed[98]. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate, sometimes taking two years[125]. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter.

nwatta Landscape Uses:Firewood, Pest tolerant, Specimen, Street tree. Of easy cultivation, it prefers a good moist well-drained soil but succeeds on most soils[11, 98]. Chlorosis can often develop as a result of iron deficiency when the plants are grown in alkaline soils. Grows well in heavy clay soils. Trees need full light and a lot of space if they are to grow well[98]. Plants are hardy to about -45°C when fully dormant[160]. This species is not a great success in Britain[1], though it does better than once thought[11]. It grows well in Cornwall[59]. Slow growing when young[11]. Plants produce prodigious root growth but very little top

growth in first year from seed[133]. A very ornamental tree[1] but a bad companion plant, inhibiting the growth of nearby plants[18, 20]. This species is commercially exploited in America for its sap[1, 11]. Along with *A. saccharum* and the sub-species *A. s. nigrum* it is the major source of maple syrup[11]. There are some named varieties[183]. The sap can be tapped within 10 - 15 years from seed but it does not flow so well in areas with mild winters[160]. Special Features:North American native, Inconspicuous flowers or blooms.

6.2.26 *Cornus officinalis*

Shan Zhu Yu, Asiatic dogwood, Japanese Cornel Dogwood
5 tlin 8 cyuc 4 kcaok 0 tcan 3 dwat 10 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik-
lwis hpa7tmwatli xre7t hjonli

drutta *Cornus officinalis* is a deciduous Shrub growing to 10 m (32ft) by 10 m (32ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from February to March, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[105, 177]. The fully ripe fruit is quite pleasant but slightly astringent[K]. It is about 1.5cm long[200]. The fruit contains about 8.6% sugars, 2.9% malic acid, 0.74% ash[179].

dwatta Antibacterial Antifungal Antiperiodic Antiseptic Antitumor Astringent Diuretic Hepatic Hypotensive Malaria Tonic UrinaryShan Zhu Yu has been used for at least 2,000 years in Chinese herbal medicine. It is a herb that "stabilizes and binds" and is used principally to reduce heavy menstrual bleeding and unusually active secretions including copious sweating, excessive urine, spermatorrhoea and premature ejaculation[147, 238, 254]. Like all herbs that suppress bodily fluids (even excessive ones), it will simply prolong or lead to a worsening of symptoms if it is used without tonic or detoxifying herbs[254]. It is, therefore, normally used in combination with herbs such as *Rehmannia glutinosa* and is an ingredient of the "Pill of eight ingredients" which is used in China to "warm up and invigorate the yang of the loins"[254]. The fruit is antibacterial, antifungal, hypotensive, antitumor, astringent, diuretic, hepatic and tonic[116, 147, 176, 178, 238]. The fruit, without the seed, is decocted for the treatment of arthritis, fever and a wide range of other ailments[218, 279]. It is used in the treatment of senile lumbago, diabetes, cystitis, tinnitus etc[174, 254, 279]. The fruit has an antibacterial action, inhibiting the growth of *Bacillus dysenteriae* and *Staphylococcus*[176]. The fruit is harvested when fully ripe and is dried for later use[238]. The stem bark is astringent, antimalarial and tonic[218]. The plant is antibacterial, diuretic, hypotensive and a urinary antiseptic[218].

nrakta E. Asia - China, Japan, Korea. ksacta Woodland, 1200 - 1800 metres in W. China[109]. Mountains, slopes, forest margins and forests at elevations of 400 - 1500, occasionally to 2100 metres[266].

propta Seed - best sown as soon as it is ripe in a cold frame or in an outdoors seedbed if there is sufficient seed[80, 113]. The seed must be separated from the fruit flesh since this contains germination inhibitors[80, 164]. Stored seed should be cold stratified for 3 - 4 months and sown as early as possible in the year[164]. Scarification may also help as may a period of warm stratification before the cold stratification[80, 164]. Germination, especially of stored seed, can be very slow, taking 18 months or more[164]. Prick out the seedlings of cold-frame sown seeds into individual pots as soon as they are large enough to handle and grow the plants on for their first winter in a greenhouse, planting out in the spring after the last expected frosts. Cuttings of half-ripe side shoots, July/August in a frame. Cuttings of mature wood of the current year's growth, taken with a heel if possible, autumn in a cold frame. High percentage[78]. Layering of new growth in June/July. Takes 9 months[78].

nwatta Landscape Uses:Border, Massing, Standard, Specimen, Street tree. An easily grown plant, it succeeds in any soil of good or moderate fertility[1], ranging from acid to shallow chalk[200]. Grows well in heavy clay soils. Succeeds in full sun or light shade[188]. A very ornamental plant[1], it is very closely related to *C. mas*[1, 11] but is more tree-like in its habit[K]. Plants in this genus are notably resistant to honey fungus[200]. Special Features: Attractive flowers or blooms.

6.2.27 *Pyrus pyrifolia culta*

Asian Pear

5 tlin 9 cyuc 4 kcaok 0 tcan 1 dwat 10 m hkuc
hmimhtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flat-
priklwis hpa7tmwatli xre7t hjonli

drutta *Pyrus pyrifolia culta* is a deciduous Tree growing to 10 m (32ft 10in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in April. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[2, 105]. Crisp, juicy with a fine flavour[178]. The fruit contains about 6 - 9.5% sugar and up to 0.56% fruit acids[179].

dwatta Antiseptic Astringent Febrifuge Nervine PectoralAntiseptic, astringent, febrifuge, nervine, pectoral[178].

nrakta A cultivated form of *P. pyrifolia*. ksacta Not known in the wild.

propta Seed - best sown in a cold frame as soon as it is ripe in the autumn, it will then usually germinate in mid to late winter. Stored seed requires 8 - 10 weeks cold stratification at 1°C and should be sown as early in the year as possible[200]. Temperatures over 15 - 20°C induce a secondary dormancy in the seed[200]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in a cold frame or greenhouse for their first year. Plant them out in late spring or early summer of the following year. The seed of pear cultivars will not usually breed true to type.

nwatta Prefers a good well-drained loam in full sun[200]. Grows well in heavy clay soils. Tolerates light shade but does not fruit so well in such a position. Tolerates atmospheric pollution, excessive moisture and a range of soil types if they are moderately fertile[200]. Established plants are drought tolerant[200]. Plants are hardy to at least -15°C[200]. Cultivated for its edible fruit in China and Japan, there are many named varieties[183]. A hybrid between this plant and *P. communis culta* is more suitable for warmer climates[11].

6.2.28 *Crataegus azarolus*

Azarole

5 tlin 9 cyuc 4 kcaok 0 tcan 2 dwat 10 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli flatprik-
lwis hpa7tmwatli xre7t hjonli

drutta *Crataegus azarolus* is a deciduous Tree growing to 10 m (32ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in June. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked in pies, preserves etc[1, 2, 3, 11, 34, 183]. The fruit can be used fresh or dried for later use. A pleasant acid taste[89]. In warm temperate areas the fruit develops more fruit sugars and has a fragrant sugary pulp with a slightly

acid flavour[183]. It can be eaten out of hand. In cooler zones, however, the fruit does not develop so well and is best cooked or used in preserves[183]. The fruit is very variable in size and colour, it is up to 25mm in diameter[200]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta S. Europe to W. Asia. ksacta Dry hillsides and mountains in woods and hedges[50].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. The azarole has long been cultivated for its edible fruit in S. Europe, though it is now going out of favour[3, 11]. There are some named varieties[46]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Hawthorns in general hybridize freely with other members of the genus[200]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

6.2.29 *Actinidia purpurea*

Purple hardy kiwi

5 tlin 9 cyuc 4 kcaak 1 tcan 0 dwat 10 m hkc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis hpa7tmwatli nyanhjen hjonli

drutta *Actinidia purpurea* is a deciduous Climber growing to 10 m (32ft 10in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in June, and the seeds ripen in November. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Bees, insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay)

soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[3, 105]. Sweet[177, 183, 200]. The fruit is up to 2.5cm long[198]. It contains a number of small seeds, but these are easily eaten with the fruit[K].

nrakta E. Asia - W. China ksacta Mountain forests, thickets, streamsidess and moist places at elevations of 700 - 3600 metres[266].

propta Seed - sow spring in a greenhouse[133]. It is probably best if the seed is given 3 months stratification[113], either sow it in a cold frame as soon as it is ripe in November or as soon as it is received. Fresh seed germinates in 2 - 3 months at 10°C, stored seed can take longer[133]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. When the plants are 30cm or more tall, plant them out into their permanent positions in late spring or early summer, after the last expected frosts[K]. Most seedlings are male[126]. The seedlings are subject to damping off, they must be kept well ventilated[113]. Cuttings of softwood as soon as ready in spring in a frame[K]. Cuttings of half-ripe wood, July/August in a frame. Very high percentage[113]. Cuttings of ripe wood, October/November in a frame.

nwatta Prefers a sound loamy neutral soil[1, 200]. Succeeds in semi-shade but full sun is best for fruit production[200]. Prefers a sheltered position[200]. Dormant plants are very hardy but young spring growth is susceptible to frost damage[160]. Fruits are formed on second year wood and also on fruit spurs on older wood[126], any pruning is best carried out in the winter[219]. This is a climbing plant, supporting itself by twining around branches etc[200]. This species is possibly no more than a form of *A. arguta*[198], differing in its longer narrower leaves[126, 200]. It is treated as a synonym of *A. arguta* in the draft Flora of China[266]. At least one named variety has been developed for its edible fruit[183]. Plants in this genus are notably resistant to honey fungus[200]. Dioecious. Male and female plants must be grown if seed is required. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Woody. Growth habit is a single or multiple shooting vine from a crown [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

6.2.30 *Pyrus pyrifolia*

Sand Pear, Chinese pear

5 tlin 9 cyuc 4 kcaak 0 tcan 1 dwat 10 m hkc
hmimhtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Pyrus pyrifolia* is a deciduous Tree growing to 10 m (32ft 10in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in April, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked. Hard and gritty[11]. Firm crisp and juicy when fully ripe, they are eaten out of hand or used in fruit salads, pies or baked etc[183]. The fruit is up to 3cm long[200]. Up to 5cm in another report[194]. The average yield from wild trees in the Himalayas is 83kg per year, though some trees yield up to 200kg[194]. The fruit contains about 4.9% sugars, 3.2% protein, 0.9% pectin[194].

dwatta Antiseptic Astringent Febrifuge Nervine PectoralAntiseptic, astringent, febrifuge, nervine, pectoral[178].

nrakta E. Asia - China, India, Taiwan Warm rainy regions at elevations of 100 - 1400 metres in China[266]. Naturalized in low mountains and around villages in C. and S. Japan[58].

propta Seed - best sown in a cold frame as soon as it is ripe in the autumn, it will then usually germinate in mid to late winter. Stored seed requires 8 - 10 weeks cold stratification at 1°C and should be sown as early in the year as possible[200]. Temperatures over 15 - 20°C induce a secondary dormancy in the seed[200]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in a cold frame or greenhouse for their first year. Plant them out in late spring or early summer of the following year.

nwatta Prefers a good well-drained loam in full sun[200]. Grows well in heavy clay soils. Tolerates light shade but does not fruit so well in such a position. Tolerates atmospheric pollution, excessive moisture and a range of soil types if they are moderately fertile[200]. Established plants are drought tolerant[200]. Plants are hardy to at least -15°C[200]. A parent of the cultivated Asian pears[11]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

6.2.31 Ziziphus jujuba

Jujube

5 tlin 10 cyuc 4 kcak 3 tcan 3 dwat 10 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjlutnyik hpa7tli flat-prikwswlip hpa7tmwatli fyifxre7t hjonli

drutta Ziziphus jujuba is a deciduous Tree growing to 10 m (32ft) by 7 m (23ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. It is in flower from April to May, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista Caution in diabetics on allopathic medication [301].

kcakta Edible Parts: Fruit Leaves Edible Uses: Coffee Fruit - raw or cooked[1, 2, 3, 100, 158]. Mealy and sweet[46]. A sourish-sweet flavour[174]. The fruit can be eaten fresh, dried like dates or cooked in puddings, cakes, breads, jellies, soups etc[183]. The dried fruit has the nicest taste[11, 132]. The fruits are often left to become wrinkled and spongy, which increases their sweetness, and are then eaten fresh or cooked[238]. The dried fruit can also be ground into a powder. This powder is used in the preparation of 'kochujang', a fermented hot pepper-soybean paste that resembles miso[183]. Fruits contain one or two seeds[238]. Average yields from wild trees in the Himalayas are 9.5kg per year[194]. The fruit contains about 8.7% sugars, 2.6% protein, 1.4% ash, 1.7% pectin and 1.3% tannin[194]. The fruit is about 25mm long, though it can be larger in cultivated varieties[200]. The fruit can be used as a coffee substitute[183]. Leaves - cooked. A famine food, they are only used when all else fails[179]. A nutritional analysis is available[218].

tcanta Charcoal Fuel Hedge Hedge Wood Plants can be grown as a hedge[178]. Wood - dense, hard, compact, tough. Used for turnery, agricultural implements etc[74, 146, 158]. It makes an excellent fuel[146] and a good charcoal[158]. Espalier: tree or other plants that is trained to grow flat against a support (such as a trellis or wall).

dwatta Anodyne Antidote Astringent Cancer Diuretic Emollient Expectorant Hypnotic Narcotic Pectoral Poultrice Refrigerant Sedative Skin Stomachic Tonic Jujube is both a delicious fruit and an effective herbal remedy. It aids weight gain, improves muscular strength and increases stamina[254]. In Chinese medicine it is prescribed as a tonic to strengthen liver function[254]. Japanese research has shown that jujube increases immune-system resistance. In one clinical trial in China 12 patients with liver complaints were given jujube, peanuts and brown sugar nightly. In

four weeks their liver function had improved[254]. Antidote, diuretic, emollient, expectorant[11, 61, 174, 178, 194]. The dried fruits contain saponins, triterpenoids and alkaloids[279]. They are anodyne, anticancer, pectoral, refrigerant, sedative, stomachic, stypitic and tonic[4, 176, 218]. They are considered to purify the blood and aid digestion[240]. They are used internally in the treatment of a range of conditions including chronic fatigue, loss of appetite, diarrhoea, pharyngitis, bronchitis, anaemia, irritability and hysteria[176, 238, 279]. The seed contains a number of medically active compounds including saponins, triterpenes, flavonoids and alkaloids[279]. It is hypnotic, narcotic, sedative, stomachic and tonic[147, 176, 218]. It is used internally in the treatment of palpitations, insomnia, nervous exhaustion, night sweats and excessive perspiration[176, 238]. The root is used in the treatment of dyspepsia[218]. A decoction of the root has been used in the treatment of fevers[4, 240]. The root is made into a powder and applied to old wounds and ulcers[240]. The leaves are astringent and febrifuge[4, 218]. They are said to promote the growth of hair[218]. They are used to form a plaster in the treatment of strangury[240]. The plant is a folk remedy for anaemia, hypertension, nephritis and nervous diseases[218]. The plant is widely used in China as a treatment for burns[218].

nrakta E. Asia - China, India, Sri Lanka, Nepal, Bhutan, Myanmar, Thailand, Malaysia, Indonesia to Australia. ksakta Dry gravelly or stony slopes of hills and mountains[74].

propta Seed - best sown in a cold frame as soon as it is ripe. Stored seed requires 3 months warm then 3 months cold stratification[113]. Germination should take place in the first spring, though it might take another 12 months. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for at least their first winter. Plant out in early summer. Root cuttings in a greenhouse in the winter[200]. Best results are achieved if a temperature of 5 - 10°C can be maintained[238]. Cuttings of mature wood of the current season's growth, November to January in a frame[238]. Division of suckers in the dormant season[174]. They can be planted out direct into their permanent positions if required.

nwatta Succeeds in most soils so long as they are well-drained[3, 200]. Prefers an open loam and a hot dry position[1, 3]. Succeeds in an alkaline soil[200]. Plants are fast growing, even in poor soils[146]. Plants are hardy to about -20°C[200]. Another report says that they are hardy to about -30°C when fully dormant[160]. The jujube is often cultivated in warm temperate zones for its edible fruit, there are many named varieties[50, 183]. The trees need a hot dry summer if they are to fruit well, which rather restricts their potential in a country like Britain[238, K]. The tree spreads by root suckers and self-sowing, often forming dense thickets. Where the climate suits it, the plant can escape from cultivation and become an invasive and problematic weed[274]. Trees are resistant to most pests and diseases[160]. Responds well to coppicing[146]. Trees form a deep taproot and should be planted into their permanent positions as soon as possible[200]. Fast growing and quick to mature, it can fruit in 3 - 4 years from seed[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

6.2.32 Prunus armeniaca

Apricot

5 tlin 7 cyuc 4 kcak 4 tcan 3 dwat 9 m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli flat-prikwswlip hpa7tmwatli fyifxre7t hjonli

drutta Prunus armeniaca is a deciduous Tree growing to 9 m (29ft) by 6 m (19ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from March to April, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid,

acidic and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

This species produces hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. Usually present in too small a quantity to do any harm, any very bitter seed or fruit should not be eaten[65]. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death. Oral doses of 50g of hydrogen cyanide can be fatal (=30g of kernels or 50-60 kernels at 2 mg HCN/g kernel) [301].

Edible Parts: Fruit Oil Oil Seed **Edible Uses:** Gum Oil Oil Fruit - raw, cooked or dried for later use[1, 2, 3, 34]. The best forms are soft and juicy with a delicious rich flavour[K]. Wild trees in the Himalayas yield about 47.5kg of fruit per year[194]. The fruit of the wild form contains about 6.3% sugars, 0.7% protein, 2.5% ash, 2.5% pectin. There is about 10mg vitamin C per 100g of pulp[194]. The fruit is about 5cm in diameter and contains one large seed[200]. **Seed** - raw or cooked[183]. Bitter seeds should be eaten in strict moderation, but sweet ones can be eaten freely[132]. The bitter seeds can be used as a substitute for bitter almonds in making marzipan etc[4]. An edible gum is obtained from the trunk[64]. The seed contains up to 50% of an edible semi-drying oil[4, 57, 61, 183].

Adhesive Dye Gum Oil Wood An edible semi-drying oil is obtained from the seed[57]. Used for lighting[194]. The oil has a softening effect on the skin and so it is used in perfumery and cosmetics, and also in pharmaceuticals[4, 61]. A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Wood - handsome, hard, durable. Agricultural implements etc[146, 194]. **Espalier:** tree or other plants that is trained to grow flat against a support (such as a trellis or wall).

Analgesic Anthelmintic Antiasthmatic Antidote Antipyretic Antisepctic Antispasmodic Antitussive Demulcent Emetic Emollient Expectorant Laxative Ophthalmic Pectoral Sedative Tonic Vitamin C Vulnerary Apricot fruits contain citric and tartaric acid, carotenoids and flavonoids[283]. They are nutritious, cleansing and mildly laxative[254]. They are a valuable addition to the diet working gently to improve overall health. The salted fruit is anti-inflammatory and antiseptic[283]. It is used medicinally in Vietnam in the treatment of respiratory and digestive diseases[283]. **Antipyretic, antiseptic, emetic, ophthalmic**[194]. The flowers are tonic, promoting fecundity in women[218]. The bark is astringent[254]. The inner bark and/or the root are used for treating poisoning caused by eating bitter almond and apricot seeds (which contain hydrogen cyanide)[218]. Another report says that a decoction of the outer bark is used to neutralize the effects of hydrogen cyanide[238]. The decoction is also used to soothe inflamed and irritated skin conditions[254]. The seed is analgesic, anthelmintic, antiasthmatic, antispasmodic, antitussive, demulcent, emollient, expectorant, pectoral, sedative and vulnerary[176, 218]. It is used in the treatment of asthma, coughs, acute or chronic bronchitis and constipation[176, 279]. The seed contains 'laetrile', a substance that has also been called vitamin B17[218]. This has been claimed to have a positive effect in the treatment of cancer, but there does not at present seem to be much evidence to support this[K]. The pure substance is almost harmless, but on hydrolysis it yields hydrocyanic acid, a very rapidly acting poison - it should thus be treated with caution[218]. In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

E. Asia - N. China, Mongolia. ksacta Most trees growing apparently wild have escaped from cultivation but there are pure stands of the trees in Tibet on mountain slopes in sparse forests at elevations of 700 - 3000 metres[266].

Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cut-

tings of half-ripe wood with a heel, July/August in a frame[11, 200]. Difficult[113]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Difficult. Layering in spring.

Global Fruit Crop Industrial Crop: Oil Management: Standard Staple Crop: Protein-oil Landscape Uses : Specimen, Espalier. Requires a well-drained moisture-retentive fertile soil in a warm sunny position[11, 200]. Succeeds in light shade but fruits better in a sunny position[200]. Thrives in a loamy soil, doing well on limestone[11]. Prefers some chalk in the soil but is apt to become chlorotic if too much is present[11]. Prefers a pH in the range 6.5 to 7.5[200]. Dislikes clay soils[37, 61]. Intolerant of saline soils[200]. Trees drop their fruit buds if there is a summer drought[200]. The apricot is widely cultivated for its edible fruit in temperate areas that have long hot summers, there are many named varieties[183, 200]. The tree is perfectly hardy in Britain but it usually flowers very early in the spring and the flowers are then liable to be destroyed by frosts[11]. It really requires a more continental climate (with its clearly defined seasons) than it gets in Britain. However, if given the benefit of a south or west facing wall and some protection from frosts when it is in flower, reasonable crops can usually be produced in southern England[1, 219]. The plants are self-fertile[200], but hand pollination would be advisable since they are normally flowering before many pollinating insects are active. In Britain apricots are usually grown on plum rootstocks, 'St. Julien A' is the most widely used[200]. The dwarfing rootstock 'Pixie' is also a possibility, but this must be double worked with 'St. Julien A' because it is incompatible with apricots[200]. Any pruning should be carried out in the summer to allow rapid healing and therefore less risk of infection[201]. Oats should not be grown near apricots because their roots have an antagonistic effect on the roots of the apricot[201]. Tomatoes and potatoes are also bad companions for apricots[201]. If nasturtiums (*Tropaeolum* spp) are grown under apricots they will make the fruit less palatable to insects, though this is not detectable by the human palate[201]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. **Special Features:** Edible, Not North American native, All or parts of this plant are poisonous, Fragrant flowers, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

6.2.33 *Prunus cerasifera*

Cherry Plum, Myrobalan Plum, Newport Cherry Plum, Pissard Plum

5 tin 8 cyuc 4 kcak 3 tcan 1 dwat 9 m hkuc hmimhtuc twytlj tcup hwicli brasjlutnykifrip hpa7tli flatprikliwis hpa7tmwtli xre7t hjonli

drutta *Prunus cerasifera* is a deciduous Tree growing to 9 m (29ft) by 9 m (29ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in March, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison

that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

ksakta Edible Parts: Fruit Seed**Edible Uses:** Fruit - raw or cooked in pies, tarts, jams etc[2, 5, 12, 34, 183]. The size of a small plum with a thin skin and a nice sweet flavour[183]. The flesh is somewhat mealy but is also juicy[K]. The fruit can hang on the tree until October[K]. The fruit is about 30mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta Dye Hedge Hedge Rootstock ShelterbeltA green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Makes quite a good windbreak hedge though it cannot stand too much exposure[1, 11, 29]. Often used as a rootstock for the cultivated plums, giving them a semi-dwarfing habit[61].

dwatta BachThe plant is used in Bach flower remedies - the keywords for prescribing it are 'Desperation', 'Fear of losing control of the mind' and 'Dread of doing some frightful thing'[209]. It is also one of the five ingredients in the 'Rescue remedy'[209]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta W. Asia? Original habitat is obscure. Often planted in hedgerows in Britain but rarely naturalized. **ksakta** Not known in a truly wild situation.

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame. Softwood cuttings from strongly growing plants in spring to early summer in a frame. Layering in spring. Division of suckers in the dormant season. They can be planted out direct into their permanent positions.

nwatta Landscape Uses:Specimen. Requires a well-drained moisture retentive soil[1, 11]. Succeeds in light shade but fruits better in a sunny position[11, 200]. Thrives in a loamy soil, doing well on limestone[11]. Grows well in heavy clay soils. Prefers some chalk in the soil but apt to become chlorotic if too much is present[1]. A very ornamental plant[1], it is sometimes cultivated for its edible fruit, unfortunately this is not often borne in large quantities in Britain[3, 17], but large crops are produced every 4 years or so[K]. There are some named varieties[183]. Included as a part of *P. divaricata* by some botanists[11] though others include *P. divaricata* as a sub-species under this species[200]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. **Special Features:**Attractive foliage, Not North American native. All or parts of this plant are poisonous. Blooms are very showy. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base

[1-2].

6.2.34 *Akebia trifoliata*

Akebia, Threelobed *Akebia*

5 tlin 8 cyuc 4 kcac 2 tcac 2 dwat 9 m hkuc

pcimhmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flat-prikrlwis hpa7tmwatli hjonli

dwatta *Akebia trifoliata* is a deciduous Climber growing to 9 m (29ft 6in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in April, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Fruit**Edible Uses:** TeaFruit - raw. Sweet but insipid[2, 3, 46, 61, 105]. The fruit has a delicate flavour and a soft juicy texture[K]. The flavour can be enhanced by the addition of a little lemon juice. Valued more as a novelty, the fruit looks somewhat like a deep-purple coloured sausage[183]. The fruit is 7 - 13cm long[200]. The dried young leaves are used as a tea substitute[46, 61, 105, 183].

tcanta BasketryThe peeled stems are very pliable. They can be bleached and used in basket making[46, 61]. **Landscape Uses:** Arbor. The flowers are purple. The flowers have a sweet scent.

dwatta Analgesic Antibacterial Antifungal Antiinflammatory Antitumor Blood tonic Cardiotoxic Diuretic Emmenagogue Galactagogue UrinaryThe stems are analgesic, antibacterial, antifungal, anti-inflammatory, antitumor, blood tonic, cardiotoxic, diuretic, emmenagogue and galactagogue[147, 176]. Taken internally, it controls gram-positive bacterial and fungal infections and is used in the treatment of urinary tract infections, lack of menstruation, to improve lactation etc[176, 238]. The stems are harvested in the autumn and dried for later use[238].

nrakta E. Asia - China, Japan, Korea. **ksakta Rocky** places in woods and thickets to 1800 metres[58]. Semideciduous forest margins, open forest along valleys, scrub on hillsides and by streams at elevations of 200 - 2100 metres[266].

propta Seed - best sown in a cold frame as soon as it is ripe. Surface sow in a light position[133]. The seed usually germinates in 1 - 3 months at 15°C[133]. Stored seed should be given 1 month cold stratification[113, 133] and can be very difficult to germinate. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. Plant out in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, July/August in a frame[11, 113]. The cuttings can be slow to root[200]. Cuttings can also be taken of soft wood in spring[113]. Root cuttings, December in a warm greenhouse[113]. Layering in early spring[1]. Very easy, the plants usually self-layer and so all you need to do is dig up the new plants and plant them out directly into their permanent positions.

nwatta Requires a well-drained moisture-retentive loamy soil[11, 200]. Succeeds in acid or alkaline soils[200]. Prefers partial shade but succeeds in full sun[3, 200]. Grows well on a north facing wall[219]. Dormant plants are hardy to about -20°C but they can be somewhat tender when young[200]. Another report says that this species is not as hardy as *A. quinata*, only tolerating temperatures down to -10°C. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. This species grows very well in S.W. England. Resentful of root disturbance, either grow plants in containers prior to planting them out or plant them out whilst very young[219]. Plants are evergreen in mild winters[11]. Fast growing, it can be invasive. It grows well on deciduous trees[28]. Plants are not normally pruned, if they are growing too large they can be cut back by trimming them with shears in early spring[202]. Plants are shy to fruit, they possibly require some protection in the flowering season, hand pollination is advisable[3, 11]. Plants are probably self-sterile[182], if possible at least 2 plants should be grown, each from a different source. The flowers are

shallow, rocky or gravelly soils[229].
propta It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed[80]. Plant seedlings out into their permanent positions as soon as possible and protect them for their first winter or two[11]. Plants have a very sparse root system and the sooner they are planted into their permanent positions the better they will grow[K]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm[200]. We actually plant them out when they are about 5 - 10cm tall. So long as they are given a very good weed-excluding mulch they establish very well[K]. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Cuttings. This method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

6.2.35 Pinus cembroides

Mexican Pine Nut, Pinyon Pine

5 tlin 8 cyuc 4 kcaak 4 tcan 2 dwat 8 m hkuc
hntut cyutli hqatkyuctup hwicli hyishrasjlut hpa7tli flatprik hpa7tmwatli dyat hjonli

drutta Pinus cembroides is an evergreen Tree growing to 8 m (26ft) by 5 m (16ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 8. It is in leaf all year; in flower from May to June, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].

Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.
pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].
kcaakta Edible Parts: Inner bark SeedEdible Uses: CondimentSeed - the oily seed kernel is eaten raw, roasted, ground into a powder for making bread, cakes etc or made into a nut butter[1, 2, 11, 34, 62, 63, 92, 94, 183]. An excellent flavour[227]. A good size, the seeds are up to 15mm long[200]. Said to be the highest in protein and lowest in starch of all the pions[183]. The seed contains about 14.6% protein, 62% fat. 17.3% carbohydrate[85]. This species provides a major source of seeds for sale in Mexico[229]. Inner bark - only used in times of dire need[85]. There are no more details but inner bark is often dried, ground into a powder and then used as a thickener in soups etc or added to cereals when making bread. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulp-wood[200].

tcanta Adhesive Dye Herbicide Pitch WoodA tan or green dye is obtained from the needles[168]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. A gum pitch is used as a glue for waterproofing and repairing pottery[117, 227]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. Wood - soft, light, close-grained[82]. Somewhat fragrant when burnt[227]. Used for fuel and posts, but rarely for lumber[227].

dwatta PouliticeThe gum exuding from damaged areas of the tree is used to treat sore throats[92, 117]. The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge[4]. It is a valuable remedy used internally in the treatment of kidney and bladder complaints and is used both internally and as a rub and steam bath in the treatment of rheumatic affections[4]. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and TB[4]. Externally it is a very beneficial treatment for a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers[4].

nrakta Southern N. America - Arizona to Texas, south to Mexico. ksacta Hot arid mountain slopes above 2000 metres, with juniper and scrub oak[82, 181]. Usually in poor,

shallow, rocky or gravelly soils[229].
propta It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed[80]. Plant seedlings out into their permanent positions as soon as possible and protect them for their first winter or two[11]. Plants have a very sparse root system and the sooner they are planted into their permanent positions the better they will grow[K]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm[200]. We actually plant them out when they are about 5 - 10cm tall. So long as they are given a very good weed-excluding mulch they establish very well[K]. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Cuttings. This method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

nwatta Management: Standard Regional Crop Staple Crop: Protein-oilLandscape Uses:Pest tolerant, Screen, Specimen. Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought, succeeding in hot, dry positions[200]. This species is not hardy in the colder areas of the country, it tolerates temperatures down to between -5 and -10°C[200]. Leaf secretions inhibit the germination of seeds, thereby inhibiting the growth of other plants below the tree[18]. A slow growing plant[81, 120], it takes 25 years from seed before cones are formed[117]. The tree takes 250 - 350 years to reach full maturity[181]. The cones open and shed their seed whilst still attached to the tree[226]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. This species is sometimes held to include a number of very similar species which are here treated as separate entities[81, 82]. See *P. edulis*, *P. monophylla* and *P. quadrifolia*. These species differ mainly in the number of leaves in a bundle[1]. The sub-species *P. cembroides orizabensis*. D. Baill. has larger seeds than the type[200]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Attracts birds, North American native, Inconspicuous flowers or blooms.

6.2.36 Cydonia oblonga

Quince

5 tlin 9 cyuc 4 kcaak 3 tcan 2 dwat 7.5 m hkuc
pcimhhmhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatpriklwis hpa7tmwatli xre7t hjonli

drutta Cydonia oblonga is a deciduous Tree growing to 7.5 m (24ft) by 7 m (23ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in May, and the seeds ripen in November. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The seed is poisonous[200]. Like many of the species in the family Rosaceae it contains hydrogen cyanide (this is the substance that gives almonds their characteristic flavour). In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcaakta Edible Parts: Flowers FruitEdible Uses: Drink Gum Pectin PectinFruit - raw or cooked[4]. When grown in warm temperate or tropical climates, the fruit can become soft and juicy and is suitable for eating raw[4]. In cooler climates such as Britain, however, it remains hard and astringent and needs to be cooked before being eaten[4]. It is used in jellies, preserves etc[9, 183]. The cooked fruit adds a delicious flavour to cooked apples[3, 37, 46, 61]. Strongly aromatic with a firm but rather gritty flesh[200]. The fruit is rich in pectin[200]. The fruit is about 10m long and 9cm wide,

tapering to the stalk[200]. A nutritional analysis is available[218]. A drink can be made by adding the dried crushed seed to water, simmering for 5 minutes and sweetening to taste[183]. Flowers[183]. No further details are given.

tcanta Gum Pectin Pectin Rootstock SizeA mucilage obtained from the seed coat is used as a gum arabic substitute to add gloss to material[61, 74]. The seed contains 20% mucilage and 15% fatty oils[74]. The fruit is rich in pectin[200]. Pectin is said to protect the body against radiation[201]. The leaves contain 11% tannin[240].

dwatta Antiinflammatory Antivinous Astringent Cardiac Carminative Demulcent Digestive Diuretic Emollient Expectorant Hypotensive Laxative Pectoral Refrigerant Restorative Stimulant TonicThe stem bark is astringent, it is used in the treatment of ulcers[218]. The seed is a mild but reliable laxative, astringent and anti-inflammatory[9]. When soaked in water, the seed swells up to form a mucilaginous mass. This has a soothing and demulcent action when taken internally[4] and is used in the treatment of respiratory diseases, especially in children[240]. This mucilage is also applied externally to minor burns etc[9]. The fruit is antivinous, astringent, cardiac, carminative, digestive, diuretic, emollient, expectorant, pectoral, peptic, refrigerant, restorative, stimulant and tonic[4, 9, 46, 218]. The unripe fruit is very astringent, a syrup made from it is used in the treatment of diarrhoea and is particularly safe for children[4, 254]. The fruit, and its juice, can be used as a mouthwash or gargle to treat mouth ulcers, gum problems and sore throats[254]. The leaves contain tannin and pectin[240]. Tannin can be used as an astringent whilst pectin has a beneficial effect on the circulatory system and helps to reduce blood pressure[K].

nrakta Europe - Mediterranean. An occasional garden escape in Britain[17]. ksacta Damp rich soils in hedgerows and thickets[50, 254].

propta Seed - probably best sown in a cold frame as soon as it is ripe[K], it can also be sown in February[78]. It requires stratification[98], pre-chill the seed for 18 weeks if it is fresh, whilst old seed will require 2 weeks of warm stratification first and then 18 weeks cold treatment[164]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the cold frame for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of mature wood, November in a cold frame[3, 37]. Layering in spring. Takes 1 year[78]. Suckers, removed in spring[200].

nwatta Succeeds in most soils but prefers a light moist fertile soil and a sunny position[3, 37, 200]. Dislikes very dry or waterlogged soils[202]. Succeeds in semi-shade but does not fruit so well in such a position[202]. Plants also tolerate quite deep shade[219], though they will often not fruit at all in such a position[K]. Plants are hardy to about -15°C[202], though the fruit seldom ripens in the north of Britain unless it is grown against a sunny wall[4]. The quince has been cultivated for over two thousand years for its edible fruit and its seed, though it is not a widely grown crop[4, 46, 61, 132]. It is also much used as a dwarfing rootstock for pears and some other fruits[200]. There are some named varieties[200]. Plants require warm summers in order to fully ripen their fruit[200]. The var. 'Maliformis' ripens well in cooler summers[200]. The plant is heat tolerant in zones 9 through 3. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2].

6.2.32 Gaultheria mucronata

Prickly heath

5 tlin 9 cyuc 4 kcak 3 tcan 0 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli frusflat
hpa7tmwatli nyanhjen hjonli

drutta Gaultheria mucronata is an evergreen Shrub growing to 1.5 m (5ft) by 1.2 m (4ft in). See above for USDA hardiness. It is hardy to UK zone 6. It is in leaf all year, in flower from May to June, and the seeds ripen from October to December. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Insects. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[177]. The lilac-coloured fruit does not look tremendously edible, and the texture is somewhat like polystyrene - but the fruit of some forms is juicy, almost melts in the mouth, has a very pleasant slightly sweet flavour and makes a very good dessert fruit[K]. The fruit is up to 12mm in diameter[200].

tcanta Hedge HedgeThe plant can be used to make a low hedge[29]. A good ground cover plant for a sunny position, forming dense thickets[197]. They are best spaced about 60cm apart each way[208]. Plants can be cut back in the spring if they are becoming too lanky and open in growth[208].

nrakta S. America - S. Chile, S. Argentina. ksacta Open wet Nofagus and Drimys forest, dominant or co-dominant with Chiliotrichum in shrub communities fringing forests above high water mark and in transition to swamps and bogs from sea level to 700m

propta The seed requires a period of cold stratification. Pre-chill for 4 - 10 weeks and surface sow in a lime-free compost in a shady part of the greenhouse and keep moist[78]. The seed usually germinates well, usually within 1 - 2 months at 20°C, but the seedlings are liable to damp off. Watering them with care and making sure they get ample ventilation will reduce this risk. Watering them with a garlic infusion can help to prevent damping off[K]. Prick out the seedlings into individual pots when they are about 25mm tall and grow them on in light shade in the greenhouse for at least their first winter[K]. Plant them out in late spring or early summer. The seedlings are susceptible to spring frosts and so it might be wise to give them some protection in their first spring or two outdoors.. Cuttings of half-ripe wood 3 - 6cm long, July/August in a frame in a shady position. They form roots in late summer or spring[78]. A good percentage usually take. Division in spring just before new growth begins. 'Drop' the plants 12 months earlier by digging them up and replanting them deeper in the soil so that the branches are buried and can form roots. This works best in a sandy soil[78]. It is best to pot up the divisions and grow them on in a lightly shaded position in the greenhouse until they are established. Plant them out in the summer. Layering in September/October. Takes 12 months[78].

nwatta Requires a light well-drained lime-free soil[111]. Requires a moist acid soil according to another report[184]. Prefers a sunny position[11] but succeeds in light shade though it fruits less well in such a position[182]. A very hardy plant, tolerating temperatures down to about -20°C[184]. Plants spread quite freely, forming thickets by means of suckers[182]. Plants sometimes have hermaphrodite flowers but are usually dioecious[208] and at least one male plant is required for every 5 or 6 females if fruit is required. A very ornamental shrub, there are many named varieties[182]. 'Davis's Hybrids' is said to be hermaphrodite[182]. Plants in this genus are notably resistant to honey fungus[200].

6.2.38 Crataegus laciniata

5 tlin 9 cyuc 4 kcak 0 tcan 2 dwat 6 m hkuc
hmimhtut cyutli hgattucupha7n hwicli hrasjlutnykfrip hpa7tli
flatprkhwisslat hpa7tmwatli xre7t hjonli

drutta Crataegus laciniata is a deciduous Tree growing to 6 m (19ft) by 6 m (19ft). See above for USDA hardiness.

It is hardy to UK zone 6 and is not frost tender. It is in flower in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit **Edible Uses:** Fruit - raw or cooked[2, 105]. A pleasant acid taste[74]. The fruit is about 1.5cm in diameter[200]. A nice taste with a very good flesh to seed ratio, it can be eaten in quantity for dessert[K]. The fruit can be used in making pies, preserves, etc, and can also be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta WoodWood - heavy, close-grained, hard and tough. Used for tool handles etc[82, 74].

dwatta Cardiotion Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta E. Asia. Occasionally self-sows in Britain[17]. **ksacta Mountain thickets and rocky slopes**[50].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. A very hardy species, tolerating temperatures down to at least -18°C[202]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

6.2.39 *Mespilus germanica*

Medlar

5 tlin 8 cyuc 4 kcaak 1 tcan 1 dwat 6 m hkuc

hmmntmut cyutli tcup hwicli wrastrjutyk hpa7tli flatprikliv hpa7tmwatli fyifxre7t hjonli

drutta Mespilus germanica is a deciduous Tree growing to 6 m (19ft) by 6 m (19ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from May to June, and the seeds ripen in November. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista The seeds contain the toxic hydrocyanic acid (the substance that gives almonds their flavour) and should not be eaten in quantity[7].

kcakta Edible Parts: Fruit **Edible Uses:** Fruit - raw or cooked[2, 3, 5, 7, 12]. The fruit does not always ripen fully in cooler temperate zones such as Britain. However it can be harvested in late autumn (preferably after it has had some frost) whilst still hard and then needs to be blotted before it can be eaten raw. This entails storing it, stalk end upwards, in a cool place for a short while until it is on the point of (but not quite) rotting[200], a state described as incipient decay. At this stage the flesh turns from white to brown, becomes very soft and is quite sweet with an absolutely delicious flavour that somewhat resembles a luscious tropical fruit[K]. The fruit of the wild species is up to 25mm in diameter, though some cultivars can be 65mm or more in diameter[200].

tcanta WoodWood - hard, flexible[100].

dwatta Astringent Laxative The pulp of the fruit is laxative[7]. The leaves are astringent[7]. The seed is lithontriptic[7]. It is ground up for use, but caution should be employed since the seeds contain the toxin hydrocyanic acid[7]. The bark has been used as a substitute for quinine, but with uncertain results[7].

nrakta S.E. Europe to W. Asia. Occasionally naturalized in Britain. **ksacta Woods and hedgerows**[7, 17].

propta Seed - best sown as soon as it is ripe in late autumn in a cold frame[78]. The seed has a very hard and impermeable seedcoat and will not usually germinate until it has gone through two winters. Commercially, such seeds are soaked for a short while in sulphuric acid to break down the seed coat and allow the seed to take up moisture, this is a very delicate procedure and difficult to do on a small scale. A home gardener could try soaking the seed for 24 hours in warm water then cold stratifying it for 2 - 3 months at 1 - 5°C before sowing it. Alternatively, if you can harvest the seed green (as soon as it is mature but before the seed coat has dried and hardened), then sow it immediately in a cold frame you might reduce the time needed for it to germinate. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the cold frame for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of mature wood, November in a cold frame. Poor percentage. Layering in autumn or early spring. Takes 18 months[78].

nwatta Succeeds in most soils[11], preferring one that is moist and well-drained[1, 37, 200]. Prefers a sunny position[1, 3] and a fertile soil[188]. Occasionally cultivated for its edible fruit, there are some named varieties[183, 200]. The plant is heat tolerant in zones 9 through 6. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and

water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

6.2.40 *Phyllostachys aureosulcata*

Yellow-Groove Bamboo

5 tlin 11 cyuc 4 kcak 2 tcan 0 dwat 6 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Phyllostachys aureosulcata* is an evergreen Bamboo growing to 6 m (19ft) by 6 m (19ft). See above for USDA hardiness. It is hardy to UK zone 6. It is in leaf all year. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Shoots Stem Edible Uses: Young shoots - raw or cooked. They have very little bitterness, even when eaten raw[183, 195]. The canes of plants grown in Britain are about 25mm in diameter[K], though they can reach up to 4cm in diameter[266]. The shoots are harvested in the spring when they are about 8cm above the ground, cutting them about 5cm below soil level. Young culms are green with yellow grooves.

tcanta Plant support Wood The canes are not of the best quality but make good plant supports[195]. A good screen plant.

nrakta E. Asia - N.E. China. ksacta Not known

propta Seed - surface sow as soon as it is ripe in a greenhouse at about 20°C. Do not allow the compost to dry out. Germination usually takes place fairly quickly so long as the seed is of good quality, though it can take 3 - 6 months. Grow on in a lightly shaded place in the greenhouse until large enough to plant out. Seed is rarely available. Division in spring as new growth commences. Divisions from the open ground do not transplant well, so will need careful treatment and nurturing under cover in pots until at least late spring[238]. Division is best carried out in wet weather and small divisions will establish better than large clumps[238]. Another report says that you can take large divisions from established clumps and transfer them straight to their permanent positions, misting or drenching them frequently until they are established[200]. Basal cane cuttings in spring.

nwatta Requires a rich damp soil in a sheltered position. One report says that this is a very hardy plant, withstanding temperatures down to about -20°C, whilst another says that it dislikes prolonged exposure to hard frosts[200]. This species is notably resistant to honey fungus[200]. Plants only flower at intervals of many years. When they do come into flower most of the plants energies are directed into producing seed and consequently the plant is severely weakened. They sometimes die after flowering, but if left alone they will usually recover though they will look very poorly for a few years. If fed with artificial NPK fertilizers at this time the plants are more likely to die[122]. This is a good companion species to grow in a woodland because the plants are shallow rooted and do not compete with deep rooted trees[195]. The rootstock is running but only slightly so in the cooler climate of Britain. In warmer climates (e.g. US South West) it can spread indefinitely if not confined with an underground barrier. The bottoms of some culms have large kinks in them, this limits their use for timber etc but makes them more ornamental. Heat zone: 12-3.

6.2.41 *Sorbus mougeotii*

5 tlin 9 cyuc 4 kcak 0 tcan 0 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli fyfkrxre7t hjonli

drutta *Sorbus mougeotii* is a deciduous Tree growing to 18 m (59ft 1in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in May, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Apomictic (reproduce by seeds formed without sexual fusion). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers

well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista The seeds probably contain hydrogen cyanide. This is the ingredient that gives almonds their characteristic flavour. Unless the seed is very bitter it should be perfectly safe in reasonable quantities. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[3, 105]. Eaten in early September, the fruit was not quite ripe but had already developed a pleasant slightly sweet flavour and a mealy texture, it made a very acceptable dessert fruit[K]. The fruit is about 10mm in diameter and is produced in fairly large clusters that make harvesting quite simple[K]. It is usually bletted if it is going to be eaten raw[K]. This involves storing the fruit in a cool dry place until it is almost but not quite going rotten. At this stage the fruit has a delicious taste, somewhat like a luscious tropical fruit[K]. The fruit is up to 8mm in diameter[200].

nrakta Europe. ksacta Found in the Alps, usually on carboniferous limestone[50].

propta Seed - best sown as soon as it is ripe in a cold frame[78, 80]. If you have sufficient seed it can be sown in an outdoor seedbed[78, 80]. Stored seed germinates better if given 2 weeks warm then 14 - 16 weeks cold stratification[98], so sow it as early in the year as possible. Prick out the seedlings into individual pots when they are large enough to handle. Seedlings are very slow to put on top-growth for their first year or two[11], but they are busy building up a good root system. It is best to keep them in pots in a cold frame for their first winter and then plant them out into their permanent positions in late spring.

nwatta Succeeds in most reasonably good soils in an open sunny position[11]. Tolerates light shade[188], though it fruits better in a sunny position[K]. Plants are susceptible to fireblight[188]. A tetraploid species, it is closely related to *S. intermedia* and *S. latifolia*[200]. Very similar to *S. anglica*[11]. The trees usually have apomictic flowers. They thus produce seed asexually, each seedling being a clone of the parent[11].

6.2.42 *Crataegus champlainensis*

Quebec hawthorn

5 tlin 9 cyuc 4 kcak 0 tcan 2 dwat 6 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasljutnyikfrp hpa7tli
flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Crataegus champlainensis* is a deciduous Tree growing to 6 m (19ft 8in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked. A nice sweet flavour, the fruit is about 1.5cm in diameter[K]. The fruit can be used in making pies, preserves, etc, and can also be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nakra E. Asia - China. ksacta Riverbanks, on sandy soils or stony slopes[74].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. Closely related to *C. submollis*[200], and included in that species by some botanists[82]. This species is possibly no more than a part of *C. rotundifolia*[204].

6.2.43 *Crataegus pinnatifida major*

Chinese Haw

5 tlin 9 cyuc 4 kcaek 2 tcan 3 dwat m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli
flatprikwlisw hpa7tmwatli xre7t hjonli

drutta *Crataegus pinnatifida major* is a deciduous Tree growing to 7.5 m (24ft 7in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[3, 105, 177]. A pleasant flavour, it is sold in local markets in China[178]. The fruit can be used in making pies, preserves, etc, and can also be dried for later use. A good size, it is up to 25mm in diameter[200]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Anticholesterolemic Cardiotoxic Hypotensive Stomachic VasodilatorThe fruits and flowers of hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct

and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222]. The fruits are anticholesterolemic, cardiotoxic, stomachic and vasodilator. Their use improves the blood circulation and lowers blood pressure[176]. The fruits are used in the treatment of dyspepsia, stagnation of fatty foods, abdominal fullness, retention of lochia, amenorrhoea, postpartum abdominal pain, hypertension and coronary heart disease[176].

nakra E. Asia - China. ksacta Riverbanks, on sandy soils or stony slopes[74].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A very ornamental plant, this sub-species is widely cultivated for its edible fruit in China[266], it is larger than the type species[46, 178, 200].

6.2.44 *Actinidia melanandra*

Red Kiwi

5 tlin 9 cyuc 4 kcaek 0 tcan 0 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli nyanhjen hjonli

drutta *Actinidia melanandra* is a deciduous Climber growing to 7 m (23ft). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from June to July, and the seeds ripen from October to November. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Bees, insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[126, 183]. The globose fruit is hairless when fully ripe and up to 45mm long[183, 198, 266]. It contains a number of small seeds, but these are easily eaten with the fruit[K].

nrakta E. Asia - W. China. ksakta Thickets around 1800 metres in W. Hupeh, Szechwan and N. Yunnan[109]. Broad-leaved forests, mountain forests and moist places at elevations of 1000 - 1600 metres[266].

propta Seed - sow spring in a greenhouse[133]. It is probably best if the seed is given 3 months stratification[113], either sow it in a cold frame as soon as it is ripe in November or as soon as it is received. Fresh seed germinates in 2 - 3 months at 10°C, stored seed can take longer[133]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. When the plants are 30cm or more tall, plant them out into their permanent positions in late spring or early summer, after the last expected frosts[K]. Most seedlings are male[126]. The seedlings are subject to damping off, they must be kept well ventilated[113]. Cuttings of softwood as soon as ready in spring in a frame[K]. Cuttings of half-ripe wood, July/August in a frame. Very high percentage[113]. Cuttings of ripe wood, October/November in a frame.

nwatta Prefers a sound loamy neutral soil[1, 200]. Succeeds in semi-shade but full sun is best for fruit production[200]. Prefers a sheltered position[200]. One report says that plants are not fully hardy in the colder parts of the country[219]. Young spring growth is susceptible to frost damage[160]. Fruits are formed on second year wood and also on fruit spurs on older wood[126], any pruning is best carried out in the winter[219]. The flowers have a soft, aromatic perfume[245]. This is a climbing plant, supporting itself by twining around branches etc[200]. At least one named variety has been developed for its edible fruit[183]. Plants have been seen in fruit at Kew[11]. This species is a good pollinator for *A. arguta cordifolia*[183]. Plants in this genus are notably resistant to honey fungus[200]. Dioecious. Male and female plants must be grown if seed is required. Another report says that both sexes are on one plant[182].

6.2.45 *Humulus lupulus*

Hop, Common hop, European Hop, 5 tlin 7 cyuc 4 kcak 3 tcan 5 dwat 6 m hkcuc hmimhtut cyutli hgatkyuctcup hwicli hrasljutnyik hpa7tli flat-prikliwis hpa7tmwatli nyanhjen hjonli

drutta *Humulus lupulus* is a PERENNIAL CLIMBER growing to 6 m (19ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to August, and the seeds ripen from September to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Wind. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought.

pcista Skin contact with the plant causes dermatitis in sensitive people[222]. Hops dermatitis has long been recognized. Not only hands and face, but legs have suffered purpuric eruptions due to hop picking. Although only 1 in 3,000 workers is estimated to be treated, one in 30 are believed to suffer dermatitis[269]. Dislodged hairs from the plant can irritate the eyes[222]. Sedative effect may worsen depression. Avoid during pregnancy (due to antispasmodic action on uterus). Avoid with breast, uterine and cervical cancers [301].

ksakta Edible Parts: Leaves Root Shoots Edible Uses: Drink Rutin Tea Young leaves and young shoots - cooked[2, 4, 5, 7, 9, 33, 37]. The flavour is unique and, to many tastes, delicious[183]. Young leaves can be eaten in salads[1, 183]. Use before the end of May[12]. The leaves contain rutin[218]. The fleshy rhizomes are sometimes eaten[183]. A tea is made from the leaves and cones[183]. It has a gentle calming effect[4]. The dried flowering heads of female plants are used as a flavouring and preservative in beer[2, 183]. They are also medicinal[2]. The flowering heads are sprinkled with bitter-tasting yellow translucent glands, which appear as a granular substance[4]. This substance prevents gram-negative bacteria from growing in the beer or

wort[269]. Much of the hop's use as a flavouring and medicinal plant depends on the abundance of this powdery substance[4]. The seeds contain gamma-linolenic acid, an essential fatty acid that is said to have many important functions in the human body and is rarely found in plant sources[218]. The essential oil in the flowering heads is used as a flavouring in cereal beverages and mineral waters[269]. Extracts from the plant, and the oil, are used as flavouring in non-alcoholic beverages, frozen dairy desserts, candy, baked goods and puddings, with the highest average maximum use level of 0.072% reported for an extract used in baked goods[269].

tcanta Dye Essential Fibre Paper A fine brown dye is obtained from the leaves and flower heads[4, 100, 269]. An essential oil from the female fruiting heads is used in perfumery[213, 238]. Average yields are 0.4 - 0.5%[240]. Extracts of the plant are used in Europe in skin creams and lotions for their alleged skin-softening properties[269]. A fibre is obtained from the stems[46]. Similar to hemp (*Cannabis sativa*)[100] but not as strong[115], it is used to make a coarse kind of cloth[4]. It is sometimes used for filler material in corrugated paper or board products, but is unsuited for corrugated paper because of low pulp yield and high chemical requirement, or for production of high-grade pulp for speciality paper[269]. The fibre is very durable but it is difficult to separate, the stems need to be soaked beforehand for a whole winter[4]. A paper can also be made from the fibre, the stems are harvested in the autumn, the leaves removed and the stems steamed until the fibres can be removed. The fibre is cooked for 2 hours with lye and then hand pounded with mallets or ball milled for 2½ hours. The paper is brown in colour[189].

dwatta Anodyne Antianxiety Antibacterial Antiseptic Antispasmodic Appetizer Diuretic Dysentery Febrifuge Galactogogue Hypnotic Leprosy Nerve Sedative Stomachic Tonic Hops have a long and proven history of herbal use, where they are employed mainly for their soothing, sedative, tonic and calming effect on the body and the mind. Their strongly bitter flavour largely accounts for their ability to strengthen and stimulate the digestion, increasing gastric and other secretions[254]. The female fruiting body is anodyne, antiseptic, antispasmodic, diuretic, febrifuge, hypnotic, nerve, sedative, stomachic and tonic[4, 9, 21, 46, 165, 192, 218]. Hops are widely used as a folk remedy to treat a wide range of complaints, including boils, bruises, calculus, cancer, cramps, cough, cystitis, debility, delirium, diarrhoea, dyspepsia, fever, fits, hysteria, inflammation, insomnia, jaundice, nerves, neuralgia, rheumatism, and worms[269]. The hairs on the fruits contain lupulin, a sedative and hypnotic drug[213, 218]. When given to nursing mothers, lupulin increases the flow of milk - recent research has shown that it contains a related hormone that could account for this effect[7]. The decoction from the flower is said to remedy swellings and hardness of the uterus[269]. Hop flowers are much used as an infusion or can also be used to stuff pillows where the weight of the head will release the volatile oils[213]. The fruit is also applied externally as a poultice to ulcers, boils, painful swellings etc[4, 218], it is said to remedy painful tumours[269]. The female flowering heads are harvested in the autumn and can be used fresh or dried[238]. Alcoholic extracts of hops in various dosage forms have been used clinically in treating numerous forms of leprosy, pulmonary tuberculosis, and acute bacterial dysentery, with varying degrees of success in China. The female fruiting body contains humulone and lupulone, these are highly bacteriostatic against gram-positive and acid-fast bacteria[240]. A cataplasm of the leaf is said to remedy cold tumours[269]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Humulus lupulus* for nervousness and insomnia (see [302] for critics of commission E).

nrakta Much of Europe, including Britain, to W. Asia. ksakta Hedgerows, woodlands and sunny waste ground[7].

propta Seed - sow spring in a cold frame[37]. Germination is fairly quick. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant out in the summer or following spring. Division in spring as new growth begins[1]. Very easy, you can plant the divisions straight out into their permanent positions if required[K]. Basal cuttings in March. Harvest the shoots when they are about 10 - 15cm long with plenty of underground stem. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer.

ntwatta Landscape Uses: Ground cover, Screen. Easily grown in a good garden soil in sun or semi-shade[1, 53]. Prefers a deep rich loam[37] and a warm sheltered position[187]. Plants can succeed in dry shade if plenty of humus is incorporated into the soil, once established they are also somewhat drought tolerant[190]. Hops are reported to tolerate an annual precipitation of between 31 and 137cm, an annual temperature in the range of 5.6 to 21.3°C and a pH of 4.5 to 8.2[269]. Plants are very hardy tolerating temperatures down to about -20°C when dormant[187]. The young shoots in spring, however, can be damaged by any more than a mild frost[269]. A climbing plant, supporting itself by twining around the branches of other plants[219]. Hops are frequently cultivated, both commercially and on a domestic scale, in temperate zones for their seed heads which have many medicinal qualities and are also used as a flavouring and preservative in beer. There are many named varieties[183]. They grow best between the latitudes of 35° - 51°N and 34° - 43°S, with mean summer temperatures of 16 - 18°C[269]. Generally, for beer making, the unfertilized seed heads are preferred and so most male plants are weeded out[4]. Hops are fairly deep rooted, but with a network of shallow feeding roots. These horizontal feeding roots spread out at depth of 20 - 30 cm in the soil and give rise to fibrous roots in upper layers of soil[269]. The vertical roots develop downwards to a depth of about 150 cm with a spread of 183 - 244 cm and have no fibrous roots[269]. The bruised leaves are refreshingly aromatic whilst the flowers cast a pleasing scent[245]. A food plant for many caterpillars[30]. Dioecious. Male and female plants must be grown if seed is required. Special Features: Edible, Invasive, Naturalizing, Attracts butterflies, Suitable for dried flowers, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Growth habit is a single or multiple shooting vine from a crown [1-2]. Herbaceous. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

6.2.46 Sambucus nigra

Elderberry - European Elder, Black elderberry, American black elderberry, Blue elderberry, Europea
 5 tlin 7 cyuc 4 kcaak 5 tcan 3 dwat 6 m hkcuc
 hmimhtut cyutli tcup hwicli hrasjlutnykfril hpa7tli flatprik-
 wisslip hpa7tmwatli xre7t hjonli

drutia Sambucus nigra is a deciduous Shrub growing to 6 m (19ft) by 6 m (19ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from March to November, in flower from June to July, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Flies. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure. It can tolerate atmospheric pollution.

pcista The leaves and stems are poisonous[9, 76]. The fruit of many species (although no records have been seen for this species) has been known to cause stomach upsets to some people. Any toxin the fruit might contain is liable to be of very low toxicity and is destroyed when the fruit is cooked[65, 76].

kcaakta Edible Parts: Flowers Fruit Edible Uses: Colouring Tea Fruit - raw or cooked[2, 3, 5, 46, 61]. The flavour of the raw fruit is not acceptable to many tastes, though when cooked it makes delicious jams, preserves, pies and so forth[K]. It can be used fresh or dried, the dried fruit be-

ing less bitter[12, 183, 238]. The fruit is used to add flavour and colour to preserves, jams, pies, sauces, chutneys etc, it is also often used to make wine[13, 183]. The fruit is about 8mm in diameter and is borne in large clusters[200]. Some caution is advised, see the notes above on toxicity. Flowers - raw or cooked[2, 5, 12, 53]. They can also be dried for later use[21]. The flowers are crisp and somewhat juicy, they have an aromatic smell and flavour and are delicious raw as a refreshing snack on a summers day, though look out for the insects[K]. The flowers are used to add a muscatel flavour to stewed fruits, jellies and jams (especially gooseberry jam)[238]. They are often used to make a sparkling wine[183]. A sweet tea is made from the dried flowers[21, 183]. The leaves are used to impart a green colouring to oils and fats[183].

tancanta Compost Cosmetic Dye Fungicide Hedge Hedge Insecticide Litmus Microscope Musical Pioneer Pipes Repellent WoodThe plant is a valuable addition to the compost heap[14, 18], its flowers are an alternative ingredient of 'QR' herbal compost activator[32] and the roots of the plant improve fermentation of the compost heap when growing nearby[18]. The leaves are used as an insect repellent[4, 6, 14, 66], very effective when rubbed on the skin though they do impart their own unique fragrance[K]. They can be powdered and placed amongst plants to act as a deterrent[14], or made into a spray when they act as an insecticide[7]. This is prepared by boiling 3 - 4 handfuls of leaves in a litre of water, then straining and allowing to cool before applying[201]. Effective against many insects, it also treats various fungal infections such as leaf rot and powdery mildew[201]. The dried flowering shoots are used to repel insects, rodents etc[101]. The flowers are used in skin lotions, oils and ointments[238]. Tolerant of salt-laden gales, this species can be grown as a shelter hedge in exposed maritime areas[29, 75], it is rather bare in the winter though[K]. This is an excellent pioneer species to use when re-establishing woodlands. It is very tough and wind-resistant, grows quickly and provides shelter for longer-lived and taller woodland species to establish. It will generally maintain itself in the developing woodland, though usually in the sunnier positions[K]. A dye is obtained from the fruit and the bark[13, 15]. The bark of older branches and the root have been used as an ingredient in dyeing black[4]. A green dye is obtained from the leaves when alum is used as a mordant[4]. The berries yield various shades of blue and purple dyes[4]. They have also been used as a hair dye, turning the hair black[4]. The blue colouring matter from the fruit can be used as a litmus to test if something is acid or alkaline. It turns green in an alkaline solution and red in an acid solution[4]. The pith in the stems of young branches pushes out easily and the hollow stems thus made have been used as pipes for blowing air into a fire[4]. They can also be made into musical instruments[4]. The pith of the wood is used for making microscope slides and also for treating burns and scalds[46, 61, 100]. The mature wood is white and fine-grained. It is easily cut and polishes well[4]. Valued highly by carpenters, it has many uses, for making skewers, mathematical instruments, toys etc[4, 13, 100, 244]. A good forage for animals: mule deer, elk, sheep and small birds. It is classified as nesting habitat for many birds, including hummingbirds, warblers, and vireos. Elderberries are a favorite food for migrating band-tailed pigeons in northern California.

dwatta Antiinflammatory Aperient Diaphoretic Diuretic Emetic Emollient Expectorant Galactogogue Haemostatic Laxative Ophthalmic Purgative Salve StimulantElder has a very long history of household use as a medicinal herb and is also much used by herbalists[4]. The plant has been called 'the medicine chest of country people'[4]. The flowers are the main part used in modern herbalism, though all parts of the plant have been used at times[238]. Stimulant[9, 53, 165]. The inner bark is collected from young trees in the autumn and is best sun-dried[4]. It is diuretic, a strong purgative and in large doses emetic[4, 7]. It is used in the treatment of constipation and arthritic conditions[238]. An emollient ointment is made from the green inner bark[4]. The leaves can be used both fresh or dry. For drying, they are harvested in periods of fine weather during June and July. The leaves are purgative, but are more nauseous than the bark[4]. They are also diaphoretic, diuretic, expectorant and haemostatic[4, 7]. The juice is said to be a good treatment for inflamed eyes[4]. An ointment made from the leaves is emollient and is used in the treatment of bruises, sprains, chilblains, wounds

use of the fresh flowers is used in the distillation of 'Elder Flower Water'. The flowers can be preserved with salt to make them available for distillation later in the season[4]. The water is mildly astringent and a gentle stimulant. It is mainly used as a vehicle for eye and skin lotions[4]. The dried flowers are diaphoretic, diuretic, expectorant, galactogogue and pectoral[4, 7]. An infusion is very effective in the treatment of chest complaints and is also used to bathe inflamed eyes[4]. The infusion is also a very good spring tonic and blood cleanser[4]. Externally, the flowers are used in poultices to ease pain and abate inflammation[4]. Used as an ointment, it treats chilblains, burns, wounds, scalds etc[4]. The fruit is depurative, weakly diaphoretic and gently laxative[4, 7]. A tea made from the dried berries is said to be a good remedy for colic and diarrhoea[4]. The fruit is widely used for making wines, preserves etc., and these are said to retain the medicinal properties of the fruit[4]. The pith of young stems is used in treating burns and scalds[46, 61, 100]. The root is no longer used in herbal medicine but it formerly had a high reputation as an emetic and purgative that was very effective against dropsy[4]. A homeopathic remedy is made from the fresh inner bark of young branches[4]. It relieves asthmatic symptoms and spurious croup in children[4]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Sambucus nigra* for cough and bronchitis, fevers and colds (see [302] for critics of commission E).

nrakta Europe, including Britain, from Scandinavia south and east to N. Africa and W. Asia. **ksacta** Hedgerows, scrub, woods, roadsides, waste places etc., especially on disturbed base-rich and nitrogen rich soils[9, 17].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame, when it should germinate in early spring. Stored seed can be sown in the spring in a cold frame but will probably germinate better if it is given 2 months warm followed by 2 months cold stratification first[78, 98, 113]. Prick out the seedlings into individual pots when they are large enough to handle. If good growth is made, the young plants can be placed in their permanent positions during the early summer. Otherwise, either put them in a sheltered nursery bed, or keep them in their pots in a sheltered position and plant them out in spring of the following year. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame[78]. Cuttings of mature wood of the current season's growth, 15 - 20cm with a heel, late autumn in a frame or a sheltered outdoor bed[78]. Division of suckers in the dormant season.

nwatta Industrial Crop: Dye Industrial Crop: Medicinal Management: Standard Minor Global Crop Landscape Uses: Border, Container, Massing, Pollard, Standard, Seashore, Specimen. A very easily grown plant, it tolerates most soils and situations[11, 28, 98], growing well on chalk[28, 98, 186], but prefers a moist loamy soil[200]. Grows well in heavy clay soils. Tolerates some shade but fruits better in a sunny position[37, 200]. Tolerates atmospheric pollution and coastal situations[200]. Another report says that it is intolerant of very smoky atmospheres[186]. The elder is very occasionally cultivated for its edible fruit, there are some named varieties though most of these have been developed for their ornamental value[182]. The subspecies *S. nigra alba* has white/green fruits that are nicer than the type species and are quite nice raw[K]. The elder also has a very long history of folk use, both medicinally and for a wide range of other uses. All in all it is a very valuable plant to have in the garden. The leaves often begin to open as early as January and are fully open in April[186]. The leaves fall in October/November in exposed sites, later in sheltered positions[186]. Young stems can be killed by late frosts but they are soon replaced from the ground level[186]. Very tolerant of pruning, plants can be cut back to ground level and will regrow from the base[186]. The flowers have a sweet, almost overpowering smell, not exactly pleasant when inhaled near to for it has fishy undertones, but from a distance its musky scent is appealing[245]. Very resistant to the predations of rabbits[17, 186]. The flowers are very attractive to insects[186]. The fruit is very attractive to birds[186] and this can draw them away from other cultivated fruits[14, 186]. The elder is an early colonizer of derelict land, the seed arriving in the defecations of birds and mammals[186]. It is a very good pioneer species for re-establishing woodlands. Plants in this genus are notably resistant to honey fungus[200]. **Special Features:** Attractive foliage, Not North

American native, Attractive flowers or blooms. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that grow together for their optimal soil requirements including nutrients and water. The root pattern is suckering with new plants from underground runners away from the plant [2-1].

6.2.47 *Lomatium macrocarpum*

Bigseed Biscuitroot

5 tlin 10 cyuc 4 kcak 2 tcan 2 dwat m hkuc
htuc cyutli kyucup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli fyifxre7t hjonli

drutta *Lomatium macrocarpum* is a PERENNIAL growing to 0.5 m (1ft 8in). The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Root Seed Edible Uses: Tea Root - raw or cooked[257]. A staple food for a number of native North American Indian tribes[257]. The root is usually peeled before being cooked or eaten[257]. It can be dried and ground into a powder and then used to make cakes etc[105, 161, 183]. Seed - raw or cooked. Very nutritious, they can also be ground into a powder[183] and then used with cereal flours when making bread, cakes etc, or be used as a flavouring in soups etc[257]. The seed is very small, but quite easy to harvest[183, K]. A tea can be made from the leaves, stems and flowers[183].

tcanta Incense The root has been dried then burnt as a ceremonial incense[257].

dwatta Infertility Pectoral Poultice Sedative Tonic An infusion of the roots has been used as a general strengthener for a weakened patient[257]. The infusion is also used as a treatment for colds, influenza and bronchitis[257]. The root has been chewed and the juice swallowed as a treatment for sore throats[257]. The root has been eaten by childless couples, especially older people, in order to help them conceive[257]. A poultice made from the boiled root has been used to treat swellings[257]. The leaves have been used as a padding in a child's cradle to encourage it to sleep more[257].

nrakta Western N. America - British Columbia to California. **ksacta** Open rocky hills and plains, not extending much into the mountains[60].

propta Seed - best sown as soon as it is ripe in a cold frame. Stored seed can be rather slow to germinate, when sown in the spring it usually takes at least 12 months to germinate. Giving it a period of cold stratification might reduce this time. The seedlings need to be pricked out into individual pots as soon as they are large enough to handle, and should be planted out into their permanent positions in the summer. Fresh seed can be sown immediately in situ. Division may be possible in spring or autumn.

nwatta We have almost no information on this species and do not know if it will be hardy in Britain, though judging by its native range it should succeed outdoors in much of the country. It can be assumed that plants will require a dry to moist but well-drained soil in a sunny position. Polymorphic[60]. This is a taxonomically very difficult genus, many of the species now included in it have at times been included in other genera[60]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

6.2.48 *Smilax china*

China Root

5 tlin 9 cyuc 4 kcak 0 tcan 3 dwat 4.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli nyanhjen hjonli

drutta *Smilax china* is a deciduous Climber growing to 4.5 m (14ft 9in). See above for USDA hardiness. It is hardy

zone UK zone 6. It is in flower in May, and the seeds ripen in October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Leaves Root **Edible Uses:** Rutin Tea **Root** - cooked[4, 105, 177]. Rich in starch[2], the large and fleshy roots can be dried and ground into a powder[11]. The root is harvested by severing larger roots near the crown and leaving the smaller roots to grow on[238]. Young shoots and leaves - raw or cooked[105, 159, 177, 179]. Used as a potherb[183]. The leaves are said to contain rutin, but no details of quantity were given[218]. Fruit - raw. Eaten to quench the thirst[105, 177, 183]. The fruit is about 9mm in diameter[200]. A tea is made from the leaves[177, 179, 183].

tcanta DyeA yellow dye is made from the root and leaves when alum is used as a mordant[4, 178]. With iron sulphate, the colour is brown[4].

dwatta Alternative Diaphoretic Antiscrophulatic Carmi-native Depurative Diaphoretic Diuretic Skin Tonic Urinary VD The root is alternative, antiscrophulatic, carminative, depurative, diaphoretic, diuretic and tonic[1, 4, 11, 147, 174, 178, 218]. It is considered useful when taken internally in the treatment of old syphilitic cases and is also used for certain skin diseases, including psoriasis, rheumatoid arthritis, gout, enteritis, urinary tract infections, skin ulcers etc[4, 238]. Large doses can cause nausea and vomiting, which is valuable in weakened and depraved conditions due to a poisoned state of the blood[4]. The root is harvested in the autumn and dried for later use.

nrakta E. Asia - China, Japan. **ksacta** Shrub thickets[147] in hills and mountains[58]. Forests, thickets, hillsides, grassy slopes, shaded places along valleys or streams from near sea level to 2000 metres[266].

propta Seed - sow March in a warm greenhouse[1]. This note probably refers to the tropical members of the genus, seeds of plants from cooler areas seem to require a period of cold stratification, some species taking 2 or more years to germinate[K]. We sow the seed of temperate species in a cold frame as soon as we receive it, and would sow the seed as soon as it is ripe if we could obtain it then[K]. When the seedlings eventually germinate, prick them out into individual pots when they are large enough to handle and grow them on in the greenhouse for at least their first year, though we normally grow them on in pots for 2 years. Plant them out into their permanent positions in early summer. Division in early spring as new growth begins[238]. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer. Cuttings of half-ripe shoots, July in a frame[238].

nwatta Succeeds in most well-drained soils in sun or semi-shade[200]. Hardy to about -15°C[200]. A climbing plant, supporting itself by means of tendrils and thorns as it scrambles through small trees and shrubs. A young plant is growing and thriving close to a west-facing wall at Kew Botanical gardens[K]. This species is not the true 'China root' of medicine, see the record for *S. pseudo-china*[178]. Dioecious. Male and female plants must be grown if seed is required.

6.2.49 *Hibiscus syriacus*

Rose Of Sharon, Althaea, Shrub Althea, Hardy Hibiscus 5 tlin 9 cyuc 4 kcak 2 tcan 2 dwat 3 m hkuc hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprklwis hpa7tmwatli xre7t hjonli

drutta *Hibiscus syriacus* is a deciduous Shrub growing to 3 m (9ft) by 2 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in September, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline)

soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Leaves Oil Root **Edible Uses:** Oil Tea Young leaves - raw or cooked[2, 177, 179, 183]. A very mild flavour, though slightly on the tough side, they make an acceptable addition to the salad bowl[K]. A tea is made from the leaves[2, 177, 240] or the flowers[183]. Flowers - raw or cooked[74, 105, 183]. A mild flavour and mucilaginous texture, they are delightful in salads, both for looking at and for eating[K]. Root - it is edible but very fibrous[144]. Mucilaginous, without very much flavour[144].

tcanta Dye Fibre Hair Hedge Hedge OilA low quality fibre is obtained from the stems. It is used for making cordage and paper[74]. The seed contains about 25% oil[74]. No further details are given, but it is likely to be edible. A hair shampoo is made from the leaves[74]. A blue dye is obtained from the flowers[168]. This species is planted as a hedge in S. Europe[50].

dwatta Anthelmintic Antiphlogistic Antipruritic Demulcent Diuretic Dysentery Emollient Expectorant Febrifuge Ophthalmic Skin Stomachic Styptic The leaves are diuretic, expectorant and stomachic[218, 240]. A decoction of the flowers is diuretic, ophthalmic and stomachic[147, 178, 218]. It is also used in the treatment of itch and other skin diseases[240], dizziness and bloody stools accompanied by much gas[147]. The bark contains several medically active constituents, including mucilage, carotenoids, sesquiterpenes and anthocyanidins[279]. A decoction of the root bark is antiphlogistic, demulcent, emollient, febrifuge, haemostatic and vermifuge[218, 240]. It is used in the treatment of diarrhoea, dysentery, abdominal pain, leucorrhoea, dysmenorrhoea[240, 279] and dermatophytosis[147].

nrakta E. Asia - China to India. Locally naturalized in S. Europe. **ksacta** Found wild on mountain slopes, though the original habitat is obscure[74].

propta Seed - sow early spring in a greenhouse. Germination is usually fairly quick. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the greenhouse for their first year. Plant them out into their permanent positions in late spring or early summer. Some reports say that the seed can be sown in situ outside and that it gives a good rate of germination[78, 80, 113]. Cuttings of half-ripe wood, July/August in a frame. Good percentage[113]. Cuttings of mature wood, early autumn in a frame. Good percentage[113]. Layering in mid summer to early autumn[1].

nwatta Landscape Uses: Border, Container, Foundation, Standard, Seashore, Specimen. Prefers a well-drained humus rich fertile soil in a sheltered position in full sun[200]. Succeeds in any soil of good or moderate quality[11]. Dislikes shade or badly drained soils[11]. Plants grow best with their roots in cool moist soil and their tops in a hot sunny position. This species is hardy to about -20°C[200] but plants only really succeed in the warmer countries of Britain because of their late flowering habit[184]. When planted in colder areas of the country, they will need protection for the first few winters[200]. The flowers only open in sunny weather[219]. Plants rarely require pruning[219], though they respond well to pruning and trimming and this is best carried out in the spring or just after flowering[219]. Plants are late coming into leaf, usually around the end of May or early June[182]. A very ornamental plant[1], there are many named varieties[182]. Special Features: Attracts birds, Not North American native, Naturalizing, Attracts butterflies, Blooms are very showy. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown[1-2].

6.2.51 Prunus angustifolia watsonii

Sand Plum

5 tlin 9 cyuc 4 kcaak 2 tcan 1 dwat 3 m hkuc
hmmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikkwis
hpa7tmwatli xre7t hjonli

drutta Prunus angustifolia watsonii is a deciduous Shrub growing to 3 m (9ft 10in). See above for USDA hardiness. It is hardy to UK zone 6. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no specific mention has been seen for this species, it belongs to a genus where most, if not all members of the genus produce hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit SeedEdible Uses: Fruit - raw or cooked[1, 11]. An acid taste, the fruit is often used for making preserves, pies etc[183]. A reasonable size, it is about 14mm x 9mm and contains a single large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta DyeA green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Wood - heavy, rather soft, not strong[82]. It weighs 43lb per cubic foot[235] and is of little commercial value[229].

dwatta Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta Central N. America. ksakta Thicket in low sandy places near streams[11].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame[200]. Layering in spring.

nwatta Thrives in a well-drained moisture-retentive loamy soil[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Succeeds in sun or partial shade though it fruits better in a sunny position[11, 200]. Unlike the type species, this sub-species thrives in Britain[11]. The flowers, which appear just before the leaves unfold, have a refreshing fruity scent[245]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

6.2.51 Berberis aristata

Chitra, Indian Barberry or Tree Turmeric
5 tlin 9 cyuc 4 kcaak 3 tcan 3 dwat 3.5 m hkuc

hmmimhtut cyutli kyuctup hwicli hrasjlutnyik hpa7tli flatprikkwis hpa7tmwatli fyfxfre7t hjonli

drutta Berberis aristata is an evergreen Shrub growing to 3.5 m (11ft 6in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf all year, in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Flowers FruitEdible Uses: Fruit - raw or cooked[145]. A well-flavoured fruit, it has a sweet taste with a blend of acid, though there is a slight bitterness caused by the seeds[194, K]. The fruit is much liked by children[194, K]. It is dried and used like raisins in India[2, 3, 177, 183]. The fruit contains about 2.3% protein, 12% sugars, 2% ash, 0.6% tannin, 0.4% pectin[194]. There is 4.6mg vitamin C per 100ml of juice[194]. The fruit is about 7mm x 4mm[194] - it can be up to 10mm long[200]. Plants in the wild yield about 650g of fruit in 4 pickings[194]. Flower buds - added to sauces[177, 183].

tcanta Dye Fuel TanninA yellow dye is obtained from the root and the stem[46, 61, 272]. An important source of dyestuff and tannin, it is perhaps one of the best tannin dyes available in India[194]. The wood is used as a fuel[146]. The spiny branches are used for making fencing around fields[272].

dwatta Alternative Antibacterial Antiperiodic Bitter Cancer Deobstuent Diaphoretic Dysentery Laxative Malaria Ophthalmic Tonic Vitamin CThe dried stem, root bark and wood are alternative, antiperiodic, deobstuent, diaphoretic, laxative, ophthalmic and tonic (bitter)[46, 61, 158, 194, 240]. An infusion is used in the treatment of malaria, eye complaints, skin diseases, menorrhagia, diarrhoea and jaundice[240, 243]. Berberine, universally present in rhizomes of Berberis species, has marked antibacterial effects. Since it is not appreciably absorbed by the body, it is used orally in the treatment of various enteric infections, especially bacterial dysentery[218]. It should not be used with Glycyrrhiza species (Liquorice) because this nullifies the effects of the berberine[218]. Berberine has also shown antitumour activity[218].

nrakta E. Asia - Himalayas in Nepal. ksakta Shrubberies to 3500 metres[51]. Open hillsides at elevations of 1800 - 3000 metres[272].

propta Seed - best sown as soon as it is ripe in a cold frame, it should germinate in late winter or early spring[78]. Seed from over-ripe fruit will take longer to germinate[78]. Stored seed may require cold stratification and should be sown in a cold frame as early in the year as possible[80]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse or cold frame for at least their first winter. Once they are at least 20cm tall, plant them out into their permanent positions in late spring or early summer, after the last expected frosts. The seedlings are subject to damping off, so be careful not to overwater them and keep them well ventilated[113]. Cuttings of half-ripe wood, July/August in a frame. Very difficult, if not impossible. Cuttings of mature wood of the current season's growth, preferably with a heel, October/November in a frame[78]. Very difficult, if not impossible.

nwatta Prefers a warm moist loamy soil and light shade but it is by no means fastidious, succeeding in thin, dry and shallow soils[11, 200]. Grows well in heavy clay soils. Plants are very hardy, they survived the severe winters of 1986-1987 without problems in most areas of Britain[K]. Plants can be pruned back quite severely and resprout well from the base[200]. The fruits are sometimes sold in local markets in India[194]. Hybridizes freely with other members of this genus[1]. Most plants cultivated under this name are B. chitria., B. coriaria., B. glaucocarpa. and, more commonly, B. floribunda[67, 200].

6.2.52 Hydrangea serrata amajiana

5 tlin 9 cyuc 4 kcaak 2 tcan 0 dwat 2 m hkuc
hmmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikkwis hpa7tmwatli xre7t hjonli

drutta Hydrangea serrata amagiana is a deciduous Shrub growing to 2 m (6ft 7in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

ksakta Edible Parts: Leaves **Edible Uses:** Sweetener The young leaves, even without fermentation[174], are very sweet and are used to make a sweet tea called 'tea of heaven', it is used in Buddhist ceremonies[174]]. The leaves contain phellodulin (its chemical formula is C16 H14 O), a very sweet substance that can be used as a sugar substitute[174]. The older leaves can be dried, powdered and used as a flavouring on foods[174]. The young leaves and shoots are also eaten cooked[174].

tcanta Hedge Hedge Can be grown as a low hedge[29], it is quite wind tolerant.

nrakta E. Asia - Japan. *ksakta* Found only on Amagi mountain in the wild[174].

propta Seed - surface sow in a greenhouse in spring[113]. Cover the pot with paper until the seed germinates[78]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 8cm long, July/August in a frame. Overwinter in a greenhouse and plant out in late spring[78]. Cuttings of mature wood in late autumn in a frame[200]. Mound layering in spring. Takes 12 months[78]. Leaf-bud cuttings of the current seasons growth in a frame[200].

nwatta Tolerates most soil[200], thriving in a well-drained loamy soil[1], but resenting dryness at the roots[11, 200]. Succeeds in full sun or semi-shade[200], but if it is grown in a low rainfall area then it requires shade at the hottest part of the day[11]. Does well on very acid soils with a pH around 4.5[200]. The colour of the flowers reflects the pH of the soil the plant is growing in, the flowers are pink in a neutral to alkaline soil and blue in an acid soil. Best grown in an acid soil, doing well on very acid soils (pH 4.5). There is some confusion over the correct name for this plant. We have used the name in [174] but the Flora of Japan[58] says that the correct name is *H. macrophylla angustata*. Plants are hardy to about -25°C when dormant[200], but the young growth in spring can be killed by late frosts[K]. This species is notably susceptible to honey fungus[200].

6.2.53 *Lycium chinense*

Chinese Boxthorn, Chinese desert-thorn
5 tlin 9 cyuc 4 kcaak 3 tcan 3 dwat 2.5 m hkuc
htut cyutli tcup hwicli hyishrasj|utnyik hpa7tli flatprik|lwis
hpa7tli hpa7tli hjonli

drutta Lycium chinense is a deciduous Shrub growing to 2.5 m (8ft) by 2 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6. It is in flower from June to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate maritime exposure.

pcista Some caution should be exercised with this species, particularly with regard to its edible leaves, since it belongs to a family that often contains toxins. However, use of the leaves is well documented and fairly widespread in some areas.

ksakta Edible Parts: Fruit Leaves Seed Shoots **Edible Uses:** Coffee Tea Fruit - raw, cooked in soups etc or dried for later use[174, 178, 183]. Sweet with an aniseed-like flavour[183]. The fruit is an oblong berry about 15mm long by 8mm wid[266]. Only the fully ripe fruits should be eaten[K]. Leaves and young shoots - raw or cooked[61, 174, 178]. A peppermint-like flavour, the leaves are used in salads or used as a potherb[183]. Rich in vitamin A, the leaves also

contain about 3.9% protein, 2.25% carbohydrate, 0.7% fat, 1.4% ash[179]. The roasted seed is a coffee substitute[183]. The dried leaves are a tea substitute[183].

tcanta Hedge Hedge Soil stabilization Can be grown as an informal hedge, succeeding in maritime exposure[200]. Plants have an extensive root system and can be planted to stabilize banks[200].

dwatta Antibacterial Antipyretic Cancer Haemostatic Hepatic Hypoglycaemic Infertility Kidney Ophthalmic Tonic Vasodilator Chinese boxthorn is a major Chinese tonic herb with a history of almost 2,000 years of medicinal use[254]. Both the berries and the root are used and traditionally the plant is believed to promote long life[254]. The fruit is one of the most popular tonics used in Chinese herbal medicine[176, 218]. A decoction is used to clear the vision, strengthen the kidneys, restore semen and nourish the liver[147]. The fruit protects the liver from damage caused by exposure to toxins[254]. It is also used in the treatment of diabetes mellitus, vertigo, nocturnal emissions and aching back and legs[176]. The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214]. The seed is used as a haemostat for the control of bleeding, with a special action on the kidneys and sex organs[218]. The root bark is antibacterial, antipyretic, hepatic, hypoglycaemic and vasodilator[176]. It stimulates the parasympathetic nervous system, which controls involuntary bodily functions such as digestive secretions[254]. The root is used in the treatment of pulmonary tuberculosis and pneumonia in small children[147], chronic febrile disease, night sweats, cough and asthma, tuberculosis, hypertension and diabetes mellitus[176]. The root can be harvested at any time of the year but traditionally it is harvested in the spring and can be dried for later use[254]. The root bark contains betaine. This can increase the rate of growth of farm animals and increase the weight and amount of eggs, it is used in the treatment of achlorhydria, atherosclerosis and hepatic diseases[176]. Haemostatic[174].

nrakta E. Asia - China, Japan. Naturalized in Britain, especially by the sea. *ksakta* Thickets and river banks in lowland C. and S. Japan[58].

propta Seed - sow early spring in a greenhouse. Germination is usually good and fairly quick. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the greenhouse for their first winter. Plant out in late spring or early summer. Pinch out the shoot tips of the young plants in order to encourage bushy growth[78]. Cuttings of half-ripe wood, 5 - 10cm with a heel if possible, July/August in individual pots in a frame. Good percentage[78]. Cuttings of mature wood of the current season's growth, autumn to late winter in a cold frame. High percentage[78, 200]. Division of suckers in late winter. Very easy, the suckers can be planted out direct into their permanent positions. Layering.

nwatta An easily grown plant, it does not require a rich soil, flowering and fruiting better in a well-drained soil of moderate quality[1, 11, 200]. Succeeds in impoverished soils[200]. Requires a sunny position[200]. Tolerates maritime exposure[200]. A very hardy plant, tolerating temperatures down to about -23°C[200]. This species is widely cultivated for its edible young shoots in China. There is much confusion between this species and the closely related *L. barbarum*. Most, if not all, of the plants being grown as *L. chinense* in Britain are in fact *L. barbarum*[11, 50, 200].

6.2.54 *Fagopyrum* spp.

Perennial Buckwheat
5 tlin 10 cyuc 4 kcaak 2 tcan 3 dwat 1 m hkuc
hmimhtut cyutli tcup hwicli hyishrasj|utnyik|frip hpa7tli flatprik|lwis hpa7tli hpa7tli hjonli

drutta Fagopyrum spp. is a PERENNIAL growing to 1 m (3ft 3in) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor

soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Leaves SeedEdible Uses: Leaves - raw or cooked[105, 160, 272]. Boiled or steamed and used like spinach[183]. Of excellent quality according to one report[2], but we have been less than impressed by the flavour, which has a distinct bitterness especially when eaten raw[K]. The leaves are rich in rutin (see below for details of its uses) and so they do make a healthy addition to the diet[K]. Seed - it can be sprouted and eaten raw, or cooked and used as a cereal[4]. Dried and ground into a powder, it can serve as a thickening agent in soups etc. The seed is rich in vitamin B6. Unfortunately, it is not freely produced in Britain[2]. Carbon Farming Solutions - Staple Crop: balanced carb (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1].

tcanta Animal feed, An ornamental plant.

dwatta The whole plant is anodyne, anthelmintic, antiplogistic, carminative, depurative and febrifuge. It stimulates blood circulation[147]. A decoction is used in the treatment of traumatic injuries, lumbago, menstrual irregularities, purulent infections, snake and insect bites[147]. A decoction of the roots is used in the treatment of insect bites, dysmenorrhoea, inflammation, lumbago, snakebite and traumatic injuries[218]. The leaves are rich in rutin which is a capillary tonic, antioedemic, anti-inflammatory, antispasmodic and hypotensive[218]. Rutin also inhibits carcinogenesis and protects against radiation[218].

nrakta Eurasia. ksacta Forests and cultivated areas from Pakistan to S.W. China, 1500 - 3400 metres[51]. Found alongside ditches on shady damp and fertile soils in China[147].

propta Seed - sow spring in a greenhouse. Prick out the seedlings when they are large enough to handle and plant them out into their permanent positions in the summer. Division is very easy at almost any time in the growing season, though it is best avoided in early spring because the young growth can be damaged by late frosts. The divisions can be planted out direct into their permanent positions.

nwatta Hypothetical Crop Management: Standard Staple Crop: Balanced carbClimate: boreal to cold temperate. Humidity: arid to semi-arid. Carbon Farming Solutions - Cultivation: hypothetical - F. esculentum could be crossed with F. cymosum. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

6.2.55 *Scorzonera hispanica*

Scorzonera

5 tlin 9 cyuc 4 kcak 1 tcan 0 dwat 1 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhlwis
hpa7tmwatli xre7t hjonli

drutta *Scorzonera hispanica* is a PERENNIAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from June to September, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Leaves RootEdible Uses: CoffeeRoot - cooked[2, 27, 33, 37, 105]. A sweet agreeable flavour[1]. The root is usually eaten at the end of its first year of growth, but it can be grown on for a second year without becoming tough[200]. The root is rich in inulin[46] - this is a starch that is not easily digested by humans and so generally passes straight through the digestive system and is excreted. Inulin can cause flatulence in some people[K]. Leaves - raw[27, 33, 52]. The tender young shoots are usually eaten in early spring[183]. Flower buds - raw[57]. Added to salads[183]. The petals have their own distinctive flavour and can also be added to salads[183]. The roasted root is used as a coffee substitute[183].

tcanta RepellentThe growing plant is said to repel carrot root fly from carrots growing nearby[18].

nrakta S. Europe. ksacta Cultivated ground, rocks and bushy places[50].

propta Seed - sow spring in situ. If the weather is dry, it will be advisable to water the seed in well or germination will be delayed. The seed can also be sown in situ in August. Division in autumn or as growth commences in spring. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta Succeeds in any soil in sun or light shade[200]. Prefers a light soil[37]. Occasionally cultivated for its edible root, there are some named varieties[183]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

6.2.56 *Abelmoschus esculentus*

Okra

5 tlin 11 cyuc 4 kcak 2 tcan 3 dwat 1 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhlwis
hpa7tmwatli xre7t hjonli

drutta *Abelmoschus esculentus* is an ANNUAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 8 and is frost tender. It is in flower from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers moist soil.

pcista The hairs on the seed pods can be an irritant to some people and gloves should be worn when harvesting. These hairs can be easily removed by washing[200].

kcakta Edible Parts: Fruit Leaves Oil Root SeedEdible Uses: Coffee Oil PectinImmature fruit - cooked on their own or added to soups etc[2, 27]. They can be used fresh or dried[183]. Mucilaginous[133], they are commonly used as a thickening for soups, stews and sauces[183]. The fruits are rich in pectin and are also a fair source of iron and calcium[240]. The fresh fruits contain 740 iu vitamin A[240]. The fruit should be harvested whilst young, older fruits soon become fibrous[133]. The fruit can be up to 20cm long[200]. Seed - cooked or ground into a meal and used in making bread or made into 'tofu' or 'tempeh'[183]. The roasted seed is a coffee substitute[2, 27, 133]. Probably the best of the coffee substitutes[74]. The seed contains up to 22% of an edible oil[55, 74, 177, 183, 240]. The leaves, flower buds, flowers and calyces can be eaten cooked as greens[183]. The leaves can be dried, crushed into a powder and stored for later use[183]. They are also used as a flavouring[133]. Root - it is edible but very fibrous[144]. Mucilaginous, without very much flavour[144].

tcanta Fibre Oil Paper Pectin SizeA fibre obtained from the stems is used as a substitute for jute[57, 61, 74, 169]. It is also used in making paper and textiles[171]. The fibres are about 2.4mm long[189]. When used for paper the stems are harvested in late summer or autumn after the edible seed-pods have been harvested, the leaves are removed and the stems are steamed until the fibres can be stripped off. The fibres are cooked for 2 hours with lye and then put in a ball mill for 3 hours. The paper is cream coloured[189]. A decoction of the root or of the seeds is used as a size for paper[178].

dwatta Antispasmodic Demulcent Diaphoretic Diuretic Emollient Stimulant VulneraryThe roots are very rich in mucilage, having a strongly demulcent action[4, 21]. They are said by some to be better than marsh mallow (*Althaea officinalis*)[4]. This mucilage can be used as a plasma replacement[240]. An infusion of the roots is used in the treatment of syphilis[240]. The juice of the roots is used externally in Nepal to treat cuts, wounds and boils[272]. The leaves furnish an emollient poultice[4, 21, 240]. A decoction of the immature capsules is demulcent, diuretic and emollient[240]. It is used in the treatment of catarrhal infections, ardor urinae, dysuria and gonorrhoea[240]. The seeds are antispasmodic,

cordial and stimulant[240]. An infusion of the roasted seeds has sudorific properties[240].

nrakta The original habitat is obscure. ksacta Not known in a truly wild situation.

propta Seed - sow early spring in a warm greenhouse. The seed germinates in 27 days at 15°C or 6 days at 35°C[133]. When large enough to handle, prick them out into individual pots and plant them out after the last expected frosts[200].

nwatta Industrial Crop: Fiber Management: Cop-pice Management: Standard Regional Crop Staple Crop: Protein-oil Prefers a well-drained humus rich fertile soil in full sun and a pH around 6 to 6.7[200] but it tolerates a wide range of soil types and pH from 5.5 to 8[200]. It prefers a soil with a high potash content[264]. The plant requires a warm sunny position sheltered from winds[200]. It likes plenty of moisture, both in the soil and in the atmosphere[133]. Okra is commonly cultivated in warm temperate and tropical areas for its edible seedpod, there are many named varieties[183, 200]. Most cultivars require about 4 months from sowing before a crop is produced, though some early maturing varieties can produce a crop in 50 days in the tropics[264]. This species is not very hardy in Britain, it sometimes succeeds outdoors in hot summers but is really best grown in a greenhouse since it prefers daytime temperatures of 25°C or more[260]. Plants also dislike low night temperatures[133]. There are some early-maturing varieties that are more tolerant of cooler temperate conditions and these could be tried outdoors[200]. These include 'Clemson's Spineless', 'Emerald Spineless', 'Long Green' and 'Green Velvet'[200]. The flowers are much visited by bees but they may require syringing in order to improve fertilization when plants are grown in a greenhouse. Plants resent being transplanted[133].

6.2.57 *Atriplex hortensis*

Orach, Garden orache

5 tlin 9 cyuc 4 kcaak 0 tcan 2 dwat 1.8 m hkuc
htut cyutli tcup hwicli hrasjlut hpa7tli flatpriklwissliphsom
hpa7tmwatli hjonli

drutta *Atriplex hortensis* is an ANNUAL growing to 1.8 m (6ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardness. It is hardy to UK zone 6 and is not frost tender. It is in flower from July to August, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista No member of this genus contains any toxins, all have more or less edible leaves. However, if grown with artificial fertilizers, they may concentrate harmful amounts of nitrates in their leaves. The seed contains saponins[240]. Although poisonous, saponins are poorly absorbed by the human body and so most pass through without harm. Saponins are quite bitter and can be found in many common foods such as some beans. They can be removed by carefully leaching the seed or flour in running water. Thorough cooking, and perhaps changing the cooking water once, will also normally remove most of them. However, it is not advisable to eat large quantities of food that contain saponins. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K].

kcakta Edible Parts: Leaves Seed Edible Uses: Leaves - raw or cooked[2, 16, 27, 33]. Used like spinach[9], they have a bland flavour and are traditionally mixed with sorrel leaves in order to modify the acidity of the latter[183]. Another report says that the flavour is stronger than spinach[264]. Seed - cooked. It can be ground into a meal and used in soups etc or be mixed with flour when making bread[177, 183]. The seed is said to be a good source of vitamin A[240]. The seed is also said to contain some saponins[240]. See the notes above on toxicity. The seed is small and fiddly to harvest and use.

tcanta Biomass Companion Dye A blue dye is obtained from the seed[74, 100]. The plant is a potential source of biomass. Yields of 14 tonnes per hectare have been

achieved in the vicinity of Landskrona and Lund, Sweden. Higher yields might be expected farther south. If the leaf-protein were extracted, this should leave more than 13 tonnes biomass as by-product, for potential conversion to liquid or gaseous fuels[269].

dwatta Antirheumatic Diuretic Emetic Purgative The leaves are diuretic, emetic and purgative[100, 269]. They are also said to be a stimulant to the metabolism and an infusion is used as a spring tonic and a remedy for tiredness and nervous exhaustion[9]. They have been suggested as a folk remedy for treating plethora and lung ailments[269]. The leaves are said to be efficacious when used externally in the treatment of gout[4]. The seeds, mixed with wine, are said to cure yellow jaundice. They also excite vomiting[269]. The fruits are purgative and emetic[269]. Liniments and emollients prepared from the whole plant, like the juice of the plant, are said to be folk remedies for indurations and tumours, especially of the throat[269].

nrakta Europe. An occasional garden escape in Britain[17]. ksacta Arable land, waste and disturbed ground, shingle etc[9].

propta Seed - sow March to August in situ, only just covering the seed[134]. Germination is usually good and rapid[K].

nwatta Orach is a very easily grown plant, doing equally well in a wide variety of well-drained soils, though rich, moisture-retentive soils give the quick growth that is necessary for the production of tender leaves[33, 37, 200, 269]. Plants require a position in full sun and are tolerant of saline and very alkaline soils[200]. They thrive in any temperate climate, and are drought resistant[269]. Orach is reported to tolerate an annual precipitation of 30 to 140cm, an average annual temperature in the range of 6 to 24°C, and a pH of 5.0 to 8.2[269]. Orach was formerly cultivated for its edible leaves, there are some named varieties[183]. It can be grown as a warm weather substitute for spinach[183]. Some forms of this species have bronze or deep red leaves and are occasionally grown as ornamental plants, their leaves taste the same as the green-leaved forms[K]. Plants are fast-growing[238] and usually self-sow quite freely if the surrounding soil is disturbed by hoeing etc[K]. They tolerate hot weather well, but soon go to seed so successive sowings at 4 weekly intervals are required during the growing season if a continuous supply of leaves is required[269]. Leaves can be harvested 40 - 60 days after sowing the seed[269]. This species is a poor companion plant for potatoes, inhibiting their growth when growing close to them[20].

6.2.58 *Gaylussacia baccata*

Black Huckleberry

5 tlin 9 cyuc 4 kcaak 0 tcan 1 dwat 1 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli frusflat
hpa7tmwatli xre7t hjonli

drutta *Gaylussacia baccata* is a deciduous Shrub growing to 1 m (3ft 3in) by 1 m (3ft 3in). See above for USDA hardness. It is hardy to UK zone 6. It is in flower from May to June. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[2, 3, 55]. Deliciously spicy and sweet, they can be eaten out of hand or used in pies, preserves etc[183]. They can also be dried for later use[62]. The dried fruit can be ground into a powder then mixed with cereal flours to make bread[257]. The fruit is rather seedy[235]. The fruit is about 8mm in diameter[200].

dwatta Astringent Dysentery Miscellany An infusion of the leaves, or the bark, has been used in the treatment of dysentery[257]. An infusion of the leaves has been used in the treatment of Bright's disease[257].

nrakta Eastern N. America - Newfoundland to Georgia, Manitoba, Wisconsin and Kentucky. ksacta Dry or moist woods, thickets and clearings[43], on acidic sandy soils[200].

propta Seed - best sown in the autumn in a cold frame[200]. Seeds are short-lived and difficult to germinate. Stored seed requires 1 month warm stratification followed by 2 months cold[113]. When large enough to handle, prick the

Seedlings put into individual pots of lime-free compost and grow them on in light shade in a greenhouse or cold frame for at least their first winter. Plant out into their permanent positions in late spring or early summer when they are at least 15cm tall. Cuttings of half-ripe wood, July/August in a frame[200]. Layering. Division in spring.

nwatta Requires a lime-free moist peaty soil, thriving in sun or part shade[3, 182, 200]. Plants are hardy to about -15°C[200]. Occasionally cultivated for its edible fruit, there are some named varieties selected for their larger fruits[22, 46]. The small oval leaves are covered with globules on the underside from which a resinous gum is exuded[245]. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

6.2.59 *Diplotaxis tenuifolia*

Perennial Wall Rocket

5 tlin 9 cyuc 4 kcaok 0 tcan 0 dwat 0.6 m hkuc
hmimhtut cyutli kyuctup hwicli hrasjlutnyik hpa7tli flat-
prikliwvs hpa7tmwatli xre7t hjonli

drutta *Diplotaxis tenuifolia* is a PERENNIAL growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 6. It is in flower from May to September, and the seeds ripen from June to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: LeavesEdible Uses: Leaves - raw. Used in salads, they are very strongly flavoured of cress[217]. The leaves have a hot flavour, very similar to rocket (*Eruca vesicaria sativa*) but more strongly flavoured - they make an excellent addition to a mixed salad but are too strong to be used in quantity on their own[K]. The plant is very productive, producing leaves from early spring until the autumn[K].

nrakta Southern and central Europe, possibly including Britain. ksacta Old walls and waste places in S. England, a casual further north[17]. This plant is doubtfully native in Britain[17].

propta Seed - best sown in situ as soon as it is ripe, though it can also be sown in situ in the spring. The seed usually germinates in the autumn.

nwatta See the plants native habitat for ideas on its cultivation needs[K]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2].

6.2.60 *Gaultheria japonica*

Creeping Snowberry

5 tlin 9 cyuc 4 kcaok 3 tcan 1 dwat 0.1 m hkuc
hmim cyutli tcuphja7n hwicli hrasjlut hpa7tli frusflatprik
hpa7tmwatli xre7t hjonli

drutta *Gaultheria japonica* is an evergreen Shrub growing to 0.1 m (0ft 4in) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. It is in leaf all year, in flower from May to June, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils.

Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It can grow in semi-shade (light woodland). It prefers moist or wet soil.

kcakta Edible Parts: Fruit LeavesEdible Uses: TeaFruit - raw or cooked. Pleasantly acid and refreshing[3, 101], with a delicate flavour of wintergreen[183]. An agreeable sub-acid taste, similar to *G. shallon*[2, 11]. They can be made into delicious preserves[183]. The fruit is about 6mm in diameter[200]. Leaves - raw or cooked[207]. The leaves are used to make a tea[2, 95, 161, 257]. A mild flavour of wintergreen[183]. Said to be superior to china tea[207].

tcanta A useful fast growing ground cover plant for shady positions.

dwatta CancerThe plant is said to remove the cancerous taint from the body[4]. An infusion of the leaves has been used as a tonic for a person who has overeaten[257].

nrakta E. Asia - central and northern Japan. ksacta Mossy grounds under conifers at elevations of 1600 - 2000 metres[275].

propta The seed requires a period of cold stratification. Pre-chill for 4 - 10 weeks and then surface sow in a lime-free compost in a shady part of the greenhouse and keep the compost moist[78]. The seed usually germinates well, usually within 1 - 2 months at 20°C, but the seedlings are liable to damp off. It is important to water them with care and to ensure that they get plenty of ventilation. Watering them with a garlic infusion can also help to prevent damping off[K]. Prick out the seedlings into individual pots when they are about 25mm tall and grow them on in light shade in the greenhouse for at least their first winter[K]. Plant them out in late spring or early summer. The seedlings are susceptible to spring frosts so might need some protection for their first few years outdoors. The leaves remain very small for the first few years[11]. Cuttings of half-ripe wood 3 - 6cm long, July/August in a frame in a shady position. They form roots in late summer or spring[78]. A good percentage usually take. Division in spring just before new growth begins[200]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring. Layering.

nwatta Prefers a moist but not boggy humus rich soil in shade or semi-shade[11]. A peat and moisture loving species, it requires a lime-free soil[11]. A fast growing plant[200]. The plant can make a good nesting place for mice, these mice then eat the bark of the stems in winter causing die-back. Plants in this genus are notably resistant to honey fungus[200]. *Gaultheria japonica* bears a close resemblance to *G. hispida* (L.) Bigelow of N. America and sometimes treated as a variety or subspecies of the latter. *G. japonica*, however, has calyx much longer than the bracteoles, ovate and acute calyx lobes, and shorter anther projections. In *G. hispida* the calyx is as long as or slightly longer than the bracteoles, the calyx lobes are broadly ovate and obtuse or subacute, and the anthers have distinct projections.

6.2.61 *Gaultheria hispida*

Creeping Snowberry

5 tlin 9 cyuc 4 kcaok 4 tcan 1 dwat 0.1 m hkuc
hmim cyutli tcuphja7n hwicli hrasjlut hpa7tli frusflatprik
hpa7tmwatli xre7t hjonli

drutta *Gaultheria hispida* is an evergreen Shrub growing to 0.1 m (0ft 4in) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. It is in leaf all year, in flower from May to June, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It can grow in semi-shade (light woodland). It prefers moist or wet soil.

kcakta Edible Parts: Fruit LeavesEdible Uses: TeaFruit - raw or cooked. Pleasantly acid and refreshing[3, 101], with a delicate flavour of wintergreen[183]. An agreeable sub-acid taste, similar to *G. shallon*[2, 11]. They can be made into delicious preserves[183]. The fruit is about 6mm in diameter[200]. Leaves - raw or cooked[207]. The leaves are used to make a tea[2, 95, 161, 257]. A mild flavour of wintergreen[183]. Said to be superior to china tea[207].

tcanta MiscellanyA useful fast growing ground cover plant for shady positions.

dwatta Cancer Cytostatic MiscellanyThe plant is said to remove the cancerous taint from the body[4]. An infusion of the leaves has been used as a tonic for a person who has overeaten[257].

nrakta Northern N. America. ksacta Coniferous forests and mountains in the alpine and sub-alpine zones[62]. Cold wet woods and bogs[235].

propta The seed requires a period of cold stratification. Pre-chill for 4 - 10 weeks and then surface sow in a lime-free compost in a shady part of the greenhouse and keep the compost moist[78]. The seed usually germinates well, usually within 1 - 2 months at 20°C, but the seedlings are liable to damp off. It is important to water them with care and to ensure that they get plenty of ventilation. Watering them with a garlic infusion can also help to prevent damping off[K]. Prick out the seedlings into individual pots when they are about 25mm tall and grow them on in light shade in the greenhouse for at least their first winter[K]. Plant them out in late spring or early summer. The seedlings are susceptible to spring frosts so might need some protection for their first few years outdoors. The leaves remain very small for the first few years[11]. Cuttings of half-ripe wood 3 - 6cm long, July/August in a frame in a shady position. They form roots in late summer or spring[78]. A good percentage usually take. Division in spring just before new growth begins[200]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring. Layering.

nwatta Prefers a moist but not boggy humus rich soil in shade or semi-shade[11]. A peat and moisture loving species, it requires a lime-free soil[11]. The fruit is sometimes sold in local markets[61]. A fast growing plant[200]. The plant can make a good nesting place for mice, these mice then eat the bark of the stems in winter causing die-back. Plants in this genus are notably resistant to honey fungus[200]. Gaultheria japonica bears a close resemblance to *G. hispidula* (L.) Bigelow of N. America and sometimes treated as a variety or subspecies of the latter. *G. japonica*, however, has calyx much longer than the bracteoles, ovate and acute calyx lobes, and shorter anther projections. In *G. hispidula* the calyx is as long as or slightly longer than the bracteoles, the calyx lobes are broadly ovate and obtuse or subacute, and the anthers have distinct projections. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. A clumping mat former. Forming a dense prostrate carpet spreading indefinitely [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

6.2.62 *Houttuynia cordata*

Tsi, Chameleon, Rainbow Plant, Chameleon Plant
5 tlin 10 cyuc 4 kca 2 tc 3n 2 dwat 0.6 m hkuc
pcimhmim cytuli tucpha7nhs6s hwicli hrasjlutnyik hpa7tli
flatpriklwis hpa7tmwatli xre7t hjonli

drutta *Houttuynia cordata* is a PERENNIAL growing to 0.6 m (2ft) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in June. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist or wet soil and can grow in water.

kcaakta Edible Parts: Fruit Leaves Root Shoots Edible Uses: Tender young shoots and leaves - raw or cooked as a potherb[2, 61, 103, 183, 272]. The leaves and young shoots are harvested in the spring when about 8cm long[264]. Strongly aromatic according to one report[183] whilst others say that it is rather smelly and somewhat like rotten fish[105, 178]. Our experience is that the leaves have a delicious orange-like smell and make a marvellous flavouring in salads[K]. One report says that there are two distinct chemotypes of this species. Plants from Japan have an orange scent, whilst those from China have a smell resembling coriander leaves

(Coriandrum sativum)[238]. Some people seem to really like this leaf, others are indifferent to it or strongly dislike it[K]. It also varies quite considerably according to the time of year. In the spring and summer it has a very acceptable flavour, but by autumn a distinct bitterness has crept in[K]. Root - cooked [177, 183]. Same comments on the smell as for the leaves[105]. Fruit[183]. No further details[K], but the fruit is a capsule that contains many small seeds[200].

tcanta A good ground cover plant[200]. Plants do not form a weed-suppressing cover[K]. A spreading plant, it should be spaced about 45cm apart each way[208].

dwatta Antibacterial Antidote Antiinflammatory Antiphlogistic Antiviral Astringent Depurative Diuretic Dysentery Emmenagogue Febrifuge Hypoglycaemic Laxative Ophthalmic Women's complaintsThe whole plant is antibacterial, antiinflammatory, antimicrobial, antiphlogistic, antiviral, depurative, diuretic, emmenagogue, febrifuge, hypoglycaemic, laxative and ophthalmic[103, 116, 147, 174, 176, 218, 238, 240, 279]. A decoction is used internally in the treatment of many ailments including cancer, coughs, dysentery, enteritis and fever[218]. Its use is said to strengthen the immune system[176]. Externally, it is used in the treatment of snake bites and skin disorders[238]. The leaves and stems are harvested during the growing season and used fresh in decoctions[238]. The leaf juice is antidote and astringent[218]. A root extract is diuretic[218, 240]. The root is also said to be used in medicinal preparations for certain diseases of women[240, 243]. The rhizomes yield a sterol, resembling sitosterol, which stimulates the secretion of antibiotic substances from a gram-positive spore-forming bacillus[240]. An active substance, effective in the treatment of stomach ulcers, has been extracted from the plant[240].

nrakta E. Asia - China, Japan, Himalayas. ksacta Shrubs and damp places to 2400 metres in the Himalayas[51]. Often found as a weed in wet fields[187].

propta Seed - sow spring in a greenhouse. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant them out in the summer. Division in spring[31, 56]. Very quick and easy, it can be done successfully at almost any time in the growing season[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Landscape Uses:Border, Container, Foundation, Ground cover, Massing, Woodland garden. Requires a moist to wet soil or shallow water, partial shade and a sheltered position[1, 31, 56, 238]. Whilst it grows best in a bog garden, it will succeed in moist garden borders[233] and has also grown fairly well in a dry soil in Cornwall[K]. It succeeds in full shade[208]. Plants are hardy to about -15°C[187], the top growth is killed back by frost though the roots are much hardier. Even the roots, though, can be killed in severe winters[56]. A very ornamental plant, there are some named varieties[187]. 'Chameleon' has very attractively variegated leaves with the same flavour as the species[K]. The bruised leaves emit a strong citrus smell rather like orange peel[K]. Plants have a widely spreading root system and are very invasive, though they are easier to control in drier soils[200]. Creeps harmlessly between ferns[187]. Cultivated as a salad crop in Vietnam[103] and in W. China[187]. Plants seem to be immune to the predations of rabbits[233]. Plants growing in an area with a high rabbit population were not eaten by them although other plants growing nearby were attacked[K]. Special Features: Attractive foliage, Fragrant foliage, Not North American native, Invasive, Naturalizing, Wetlands plant, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern

rhizomatous with underground stems sending roots and shoots along their length [1-2].

6.2.63 *Hemerocallis aurantiaca*

5 tlin 9 cyuc 4 kcaak 2 tcan 1 dwat 0.8 m hkuc
hmmihmtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flat-prikrlwis hpa7tmwatli dyatre7t hjonli

drutta *Hemerocallis aurantiaca* is an evergreen Perennial growing to 0.8 m (2ft 7in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf all year, in flower from June to September. The species is hermaphrodite (has both male and female organs). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the leaves are said to be hallucinogenic. Blanching the leaves removes this hallucinatory component[205]. (This report does not make clear what it means by blanching, it could be excluding light from the growing shoots or immersing in boiling water[K].)

kcaakta Edible Parts: Flowers Leaves RootEdible Uses: Leaves and young shoots - cooked[105, 177]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked. The tubular flowers are about 7.5cm long and 13cm in diameter[205]. Each stem carries 6 - 8 flowers[205]. The flowers contain carotene and starch[105, 177]. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked. A radish-like flavour but not so sharp[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China, Japan, Korea. ksacta Thickets, grasslands and streamsides at elevations of 300 - 1000 metres in Guangdong, Guangxi, and Taiwan[266].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Seed is only set if the plant is fertilized by another species, thus seedlings will not be true to the species type[233]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil[205]. Grows well in heavy clay soils. Succeeding in sun or shade, it produces more flowers in a sunny position though these flowers can be shorter-lived in very sunny positions[205]. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. The roots have spindle-shaped swellings[205]. The cultivar 'Major' is smaller than the type species, but has larger flowers, it is sometimes cultivated for these edible flowers in Japan[205]. There is some doubt as to whether this cultivar really is a form of *H. aurantiaca*[205]. Individual flowers are very short-lived, opening in the morning and withering in the evening[205]. Plants take a year or two to become established after being moved[1]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. There is some doubt as to the origins of this plant, it might have arisen in cultivation at Kew[205]. It is cultivated in Japan, where it is believed to have come from China[58]. It is quite possibly a hybrid since it is sterile unless fertilized by another species[233].

6.2.64 *Lomatium couis*

Biscuitroot, Cous biscuitroot

5 tlin 12 cyuc 4 kcaak 1 tcan 0 dwat 0.1 m hkuc
htut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flatprikrlwis hpa7tmwatli fyifxre7t hjonli

drutta *Lomatium couis* is a PERENNIAL growing to 0.1 m (0ft 4in) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 6. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcaakta Edible Parts: Root SeedEdible Uses: Root - raw or cooked[257]. It is usually peeled before being eaten[257]. The root can be dried and ground into a powder and then be mixed with cereal flours or added as a flavouring to soups etc[46, 61, 95, 105]. When dug up in the spring it has a parsnip-like flavour[161]. Seed[106]. No more details are given, though it is most likely used as an aromatic flavouring in cooked foods[K].

nrakta Western N. America. ksacta Dry often open rocky slopes and flats, often with sagebrush, especially in foothills and lowland, occasionally above the treeline[60].

propta Seed - best sown as soon as it is ripe in a cold frame. Stored seed can be rather slow to germinate, when sown in the spring it usually takes at least 12 months to germinate. Giving it a period of cold stratification might reduce this time. The seedlings need to be pricked out into individual pots as soon as they are large enough to handle, and should be planted out into their permanent positions in the summer. Fresh seed can be sown immediately in situ. Division may be possible in spring or autumn.

nwatta We have almost no information on this species and do not know if it will be hardy in Britain, though judging by its native range it should succeed outdoors in much of the country. It can be assumed that plants will require a dry to moist but well-drained soil in a sunny position. Polymorphic[60]. This is a taxonomically very difficult genus, many of the species now included in it have at times been included in other genera[60]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

6.2.65 *Peltaria alliacea*

Garlic Cress

5 tlin 9 cyuc 4 kcaak 3 tcan 0 dwat 0.3 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlut hpa7tli flatprikrlwis hpa7tmwatli xre7t hjonli

drutta *Peltaria alliacea* is an evergreen Perennial growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf all year, in flower in June, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcaakta Edible Parts: Flowers LeavesEdible Uses: Leaves - raw or cooked[105]. A strong flavour, somewhat like a cross between garlic and mustard, the leaves make a reasonable flavouring for salads[K]. The leaves are available for most of the year, even in a severe winter they remain green and lush[K]. At this time they add an especially welcome spiciness to salads[K]. They can become rather bitter in the summer, though, especially if the plants are in a dry sunny position[K]. When flowering in early summer, the plants lose their leaves for a month or two - cutting down the flowering stems at this time will induce new fresh green growth[K]. Flowers - raw. A similar flavour to the leaves, with very little bitterness, they make a very tasty addition to summer salads[K].

tcanta The plants can be used as a ground cover, somewhat slow spreading but they are effective in excluding weeds[K].

nrakta E. Europe. ksakta Hills and woods[45].
propta Seed - sow spring or autumn in a cold frame[200].
The seed germinates rapidly, prick the seedlings out into individual pots when they are large enough to handle and plant them out into their permanent positions in the summer[K].
Division in spring or autumn. Very easy, it can be done at almost any time of the year so long as the soil is kept moist. Divisions in the winter should be potted up in a greenhouse to allow themselves to establish, they can then be planted out in late spring.

nwatta Prefers a light fertile moist soil in sun or light shade[200], though it is not too fussy[K]. A very easily grown plant that tolerates considerable neglect, it produces its best crop of leaves from autumn to spring and is a potentially valuable winter salad plant[K]. The bruised leaves give off a powerful garlic smell which is difficult to remove from the hands[245].

6.2.66 *Allium tricoccum*

Wood Leek, Ramp

5 tlin 9 cyuc 4 kcaak 3 tcan 2 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hrasjltut hpa7tli flatprikhwis hpa7tmwatli xre7t hjonli

drutta *Allium tricoccum* is a BULB growing to 0.3 m (1ft) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf from March to June, in flower from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland). It prefers moist soil.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in very large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

kcaakta Edible Parts: Flowers Leaves RootEdible Uses: Bulb - raw or cooked[46, 61, 159]. An early Spring vegetable. Used mainly as a flavouring in salads and savoury dishes[238]. This is one of the best N. American wild species for sweetness and flavour[95]. A mild sweet flavour, resembling leeks[183]. The bulb is rather small, it is up to 12mm wide and 50mm tall[235] and is produced in clusters on a rhizome[200]. Leaves - raw or cooked[62]. The unfolding leaves in spring have a mild sweet flavour, resembling leeks[183]. Flowers - raw. Used as a garnish on salads. A hot onion flavour[K].

tcanta Companion RepellentThe juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20]. A good shade plant. Tolerates Juglone (a substance produced by a plant to stunt the growth of another plant).

dwatta EmeticThis species probably has most of the medicinal virtues of garlic (*Allium sativum*) but in a milder form[222, 238]. Traditionally the leaves were used in the treatment of colds and croup, and also as a spring tonic[222, 238]. The warm juice of the leaves and bulb was used externally in the treatment of earaches[222, 238]. A strong decoction of the root is emetic[222].

nrakta Eastern N. America - Quebec, south to Virginia and Iowa. ksakta Rich woods and bottoms, preferring slopes and streamsides[43]. Usually in beech and maple woods[159].

propta Seed - sow spring in a cold frame. The seed usually germinates within 12 months, but only makes a root and a small bulb in its first year of growth. Top growth is not produced until the second spring[K]. It is quite possible that if the seed can be sown when it is ripe in early summer, or in the autumn, then this will speed up germination times[K]. Sow the seed thinly in the pots so that the young seedlings can be allowed to grow on undisturbed for their first two years. Apply a liquid feed once a month during the growing season to ensure they do not suffer from mineral deficiency. When the plants are dormant at the end of their second years growth, divide them so that there are 2 - 3 small bulbs in each pot. Grow them on for a further year in the greenhouse and then plant them out when they are dormant. Division in spring.

Very easy, the divisions can be planted straight out into their permanent positions if required.

nwatta Prefers a sunny position in a light well-drained soil[1]. Grows well in light moist woodland, where the plant forms large clumps and can become invasive[203, 235]. It is probably best grown in the wild garden[203]. Plants are hardy to at least -15°C[238]. The bulbs should be planted fairly deeply[1]. The leaves die down in early summer before the flowers have fully opened. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is a bulb.

6.2.67 *Taraxacum officinale*

Dandelion - Kukraundha, Kanphool, Common dandelion, Dandelion

5 tlin 9 cyuc 4 kcaak 3 tcan 3 dwat 0.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjltutnyik hpa7tli flatprikhwisslip hpa7tmwatli fyifxre7t hjonli

drutta *Taraxacum officinale* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.3 m (1ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to May, and the seeds ripen from May to June. The species is Hermaphrodite (has both male and female organs) and is pollinated by Insects, Apomictic (reproduce by seeds formed without sexual fusion). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

pcista This plant has been mentioned in various books on poisonous plants but any possible toxins will be of very low concentration and toxicity[10]. There are reports that some people have suffered dermatitis as a result of touching the plant, this is probably caused by the latex in the leaves and stems[222].

kcaakta Edible Parts: Flowers Leaves RootEdible Uses: Coffee TeaLeaves - raw or cooked[1, 2, 4, 5, 7, 9, 12, 14, 33, 154]. When used in salads, they are rather bitter, though less so in the winter. Tender young leaves are considerably less bitter than older leaves[K]. The leaves are often blanched (by excluding light from the growing plant) before use[183]. This will make them less bitter, but they will also contain less vitamins and minerals[K]. A very nutritious food, 100g of the raw leaves contain about 2.7g. protein, 9.2g. carbohydrate, 187mg Calcium, 66mg phosphorus, 3.1mg iron, 76mg sodium, 397mg potassium, 36mg magnesium, 14000iu vitamin A, 0.19mg vitamin B1, 0.26mg vitamin B2, 35mg vitamin C[173]. Root - raw or cooked[5, 9, 12, 183]. Bitter. A turnip-like flavour[159]. Flowers - raw or cooked[102, 159]. A rather bitter flavour[K], the unopened flower buds can be used in fritters[183] and they can also be preserved in vinegar and used like capers[7]. Both the leaves and the roots are used to flavour herbal beers and soft drinks such as 'Dandelion and Burdock'[238]. The roots of 2 year old plants are harvested in the autumn, dried and roasted to make a very good coffee substitute[2, 4, 5, 12, 54, 159]. It is caffeine-free[213]. A pleasant tea is made from the flowers[12, 102]. They are also used to make wine - all green parts should be removed when making wine to prevent a bitter flavour[238]. The leaves and the roots can also be used to make tea.

tcanta Compost Cosmetic Dye Fruit ripening Latex MiscellanyThe flowers are an ingredient of 'QR' herbal compost activator[32]. This is a dried and powdered mixture of several herbs that can be added to a compost heap in order to speed up bacterial activity and thus shorten the time needed to make the compost[K]. A liquid plant feed can be made from the root and leaves[54]. A low quality latex, which can be used for making rubber, can be obtained from the roots

plant. A magenta-brown dye is obtained from the root[141]. The plant releases ethylene gas, this stunts the growth of nearby plants and causes premature ripening of fruits[14, 18]. A distilled water made from the ligules (thin appendages at the base of the leaf blades) is used cosmetically to clear the skin and is particularly effective in fading freckles[7]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Aperient Cholagogue Depurative Diuretic Eczema Hepatic Hypoglycaemic Laxative Miscellany Stomachic Tonic Urinary Vitamin C WartsThe dandelion is a commonly used herbal remedy. It is especially effective and valuable as a diuretic because it contains high levels of potassium salts and therefore can replace the potassium that is lost from the body when diuretics are used[238]. All parts of the plant, but especially the root, are slightly aperient, cholagogue, depurative, strongly diuretic, hepatic, laxative, stomachic and tonic[4, 7, 9, 21, 54, 165, 176, 222, 238]. The root is also experimentally cholagogue, hypoglycaemic and a weak antibiotic against yeast infections[222]. The dried root has a weaker action[222]. The roots can be used fresh or dried and should be harvested in the autumn when 2 years old[4]. The leaves are harvested in the spring when the plant is in flower and can be dried for later use[9]. A tea can be made from the leaves or, more commonly, from the roots[213]. The plant is used internally in the treatment of gall bladder and urinary disorders, gallstones, jaundice, cirrhosis, dyspepsia with constipation, oedema associated with high blood pressure and heart weakness, chronic joint and skin complaints, gout, eczema and acne[238]. The plant has an antibacterial action, inhibiting the growth of *Staphylococcus aureus*, *Pneumococci*, *Meningococci*, *Bacillus dysenteriae*, *B. typhi*, *C. diphtheriae*, *Proteus* etc[176]. The latex contained in the plant sap can be used to remove corns, warts and verrucae[7]. The latex has a specific action on inflammations of the gall bladder and is also believed to remove stones in the liver[7]. A tea made from the leaves is laxative[222]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Taraxacum officinale* for dyspepsia, urinary tract infections, liver and gallbladder complaints, appetite loss (see [302] for critics of commission E).

nrakta Throughout most of the northern hemisphere, including Britain. ksacta A very common weed of grassland and cultivated ground[17].

propta Seed - sow spring in a cold frame and either surface-sow or only just cover the seed. Make sure the compost does not dry out. Germination should take place within 2 weeks, though 2 weeks cold stratification may improve germination. Prick out the seedlings into individual pots when they are large enough to handle, choosing relatively deep pots to accommodate the tap root. Plant them out in early summer. Division in early spring as the plant comes into growth.

nwatta A very easily grown plant, it succeeds in most soils[1], though it prefers a well-drained humus-rich neutral to alkaline soil in full sun or light shade[37, 238]. A very hardy plant, tolerating temperatures down to at least -29°C[238]. The dandelion is a common weed of lawns and grassy places. Though it has a bitter flavour, the plant is often cultivated as a salad crop and as a medicinal plant, especially in parts of Europe. There are some named varieties with larger, more tender and less bitter leaves[183]. Dandelions can provide edible leaves all year round, especially if they are given a small amount of protection in the winter[K]. A valuable bee plant and an important food plant for the caterpillars of many butterfly and moth species[4, 24, 30, 54], it grows well in a spring meadow[24]. A deep rooting plant, it has roots up to 1 metre long and brings up nutrients from lower levels of the soil[201]. An excellent plant to grow in lawns, if the lawn is cut no more than fortnightly then the dandelions will provide a good quantity of edible leaves[K]. Grows well with alfalfa[18, 201]. Another report says that it inhibits the growth of nearby plants[54]. This is probably a reference to the fact that the plant gives off ethylene gas, this gas is a hormone that promotes the premature ripening of fruits and also induces the premature fruiting of plants, thereby stunting their growth[14, 18]. *T. officinale* is not a valid name for this species, but no valid name has as yet been ascribed to it[200]. This is actually an aggregate species of many hundreds of slightly differing species.

Most seed production is apomorphic which means that plants produce seed non-sexually and all seedlings are clones of the parent, thus small differences are maintained. Special Features:Edible, Not North American native, Invasive, Naturalizing, Suitable for dried flowers, Extended bloom season in Zones 9A and above. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

6.2.68 *Peltaria turkmena*

5 tlin 9 cyuc 4 kcak 0 tcan 0 dwat 0.5 m hkuc hmimhtut cyutli tcup hwicli hrasjlut hpa7tli flatprikwis hpa7mtwatli xre7t hjonli

drutta *Peltaria turkmena* is an evergreen Perennial growing to 0.5 m (1ft 8in) by 0.3 m (1ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf all year, in flower from April to May, and the seeds ripen in June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: LeavesEdible Uses: Leaves - raw or cooked[K]. A strong flavour, somewhat like a cross between garlic and mustard, the leaves make a reasonable flavouring for salads[K]. The leaves are available for most of the year, even in a severe winter they remain green and lush[K]. At this time they add an especially welcome spiciness to salads[K]. They can become rather bitter in the summer, though, especially if the plants are in a dry sunny position[K]. When flowering in early summer, the plants lose their leaves for a month or two - cutting down the flowering stems at this time will induce new fresh green growth[K]. Flowers - raw. A similar flavour to the leaves, with very little bitterness, they make a very tasty addition to summer salads[K].

tcanta The plants can be used as a ground cover, somewhat slow spreading but they are effective in excluding weeds[K].

nrakta W. Asia. ksacta Not known

propta Seed - sow spring or autumn in a cold frame[200]. The seed germinates rapidly, prick the seedlings out into individual pots when they are large enough to handle and plant them out into their permanent positions in the summer[K]. Division in spring or autumn. Very easy, it can be done at almost any time of the year so long as the soil is kept moist. Divisions in the winter should be potted up in a greenhouse to allow themselves to establish, they can then be planted out in late spring.

nwatta Prefers a light fertile moist soil in sun or light shade[200], though it is not too fussy[K]. A very easily grown plant that tolerates considerable neglect[K].

6.2.69 *Campanula cochleariifolia*

Fairies Thimbles

5 tlin 9 cyuc 4 kcak 0 tcan 0 dwat 0.2 m hkuc htut cyutli tcup hwicli hyishrasjlut hpa7tli flatprikwis hpa7mtwatli fyifxre7t hjonli

drutta *Campanula cochleariifolia* is a PERENNIAL growing to 0.2 m (0ft 8in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 6. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers

well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

ksakta Edible Parts: Flowers Leaves **Edible Uses:** Leaves - raw or cooked. A pleasant mild flavour[K]. Flowers - raw or cooked. Slightly sweet[K].

nrakta Europe. **ksacta** Cracks in rocks in mountains throughout most of temperate Europe[221].

propta Seed - surface sow spring in a cold frame. The seed usually germinates in 2 - 4 weeks at 18°C. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Basal cuttings in spring. Harvest the shoots when they are about 10 - 15cm long with plenty of underground stem. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer. Division in spring or autumn. Very easy[221], larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the summer or following spring.

nwatta A very easily grown plant that succeeds in most situations so long as they are not both hot and dry[221]. In nature, the plant is found in poor soils and rock crevices and, in cultivation, when introduced to the richer conditions of the garden, is apt to spread by means of seeds and a creeping rhizome - indeed some gardeners consider it a pest even though it is beautiful and long-flowering[271]. It is probably best grown in a poor soil, indeed it grows happily in pure gravel and sand[271]. It succeeds on drystone walls where it can become invasive[200]. It does especially well on the top of walls where there are cracks for it to root into[219]. Prefers a moist but well-drained sandy loam and a neutral or alkaline soil in sun or partial shade[1, 200]. Plants are hardy to at least -15°C[200]. The species in this genus do not often hybridize and so seed can generally be relied upon to come true[221]. The plants are self-fertile and often self-sow in the garden[221, 271]. There are several named varieties selected for their ornamental value[200]. 'Elizabeth Oliver' has pleasantly flavoured leaves[K]. Members of this genus are rarely if ever troubled by browsing deer[233].

6.2.70 *Apium graveolens rapaceum*

Celeriac

5 tlin 9 cyuc 4 kcaak 0 tcan 2 dwat 0.6 m hkuc

hmim cyutli tcup hwicli hrasljutnyik hpa7tli flatprikhwisslip hpa7tmwatli fyifxre7t hjonli

drutta *Apium graveolens rapaceum* is a BIENNIAL growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from June to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Flies. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland). It prefers moist soil.

pcista If the plant is infected with the fungus *Sclerotinia sclerotiorum*, skin contact with the sap can cause dermatitis in sensitive people[65].

ksakta Edible Parts: Leaves Root Seed **Edible Uses:** Condiment/Leaves - used as a flavouring in soups etc[200]. They can be eaten raw but have a very strong flavour[52]. **Seed** - a flavouring. An essential oil from the seed is also used as a flavouring. **Root** - raw or cooked[27, 33, 52]. It can be grated and added to salads, baked or added to soups, stews etc[183].

tcanta The growing plant is an insect repellent, it repels the cabbage white butterfly so is a good companion for brassicas[20].

dwatta Aperient Carminative Diuretic Emmenagogue Galactogogue Nervine Stimulant Tonic Although not as medicinally active as wild celery, the cultivated forms of celery also have the same medicinal properties and, when used as an item of the diet, will have a similar effect upon the body. These medicinal uses are as follows:- Wild celery is an aromatic bitter tonic herb that reduces blood pres-

sure, relieves indigestion, stimulates the uterus and is anti-inflammatory[238]. The ripe seeds, herb and root are aperient, carminative, diuretic, emmenagogue, galactogogue, nervine, stimulant and tonic[4, 7, 21, 165]. Wild celery is said to be useful in cases of hysteria, promoting restfulness and sleep and diffusing through the system a mild sustaining influence[4]. The herb should not be prescribed for pregnant women[238]. Seeds purchased for cultivation purposes are often dressed with a fungicide, they should not be used for medicinal purposes[238]. The root is harvested in the autumn and can be used fresh or dried[238]. The whole plant is harvested when fruiting and is usually liquified to extract the juice[238]. The seeds are harvested as they ripen and are dried for later use[238]. An essential oil obtained from the plant has a calming effect on the central nervous system. Some of its constituents have antispasmodic, sedative and anticonvulsant actions. It has been shown to be of value in treating high blood pressure[254]. A homeopathic remedy is made from the herb[9]. It is used in treating rheumatism and kidney complaints[9].

nrakta A cultivated form of garden origin. **ksacta** Not known in the wild.

propta Seed - surface sow February in a greenhouse. The maincrop can be sown as late as mid-April. Germinates in 2 - 3 weeks at 15°C. Plant out in May. The seed can harbour certain diseases of celery, it is usually treated by seed companies before being sold but if you save your own seed you should make sure that only seed from healthy plants is used[1].

nwatta Prefers a rich moist soil and an open sunny situation[1, 27, 33, 52]. Requires abundant moisture in the growing season otherwise the root will be small and tough[1]. Tolerates a pH in the range 5.2 to 8.3. The root is hardy to about -12°C and can be left in the ground over winter, to be harvested as required[200]. Roots can also be stored in boxes of sand or other such material in a cool dry shed[200]. Celeriac is a form of *A. graveolens* that has been selected for its enlarged edible root. It is occasionally cultivated commercially but more often in the garden or allotment[46, 200], there are some named varieties[183]. Any side-shoots should be removed in order to encourage a larger root[200]. A good companion plant for leeks, tomatoes, French beans and brassicas[18].

6.2.71 *Atriplex nuttallii*

Nuttall's Saltbush

5 tlin 9 cyuc 4 kcaak 0 tcan 0 dwat 0.9 m hkuc

htut cyutli kyuctcup hwicli hyishrasljut hpa7tli flatprikhwissliphsom hpa7tmwatli nyanhjen hjonli

drutta *Atriplex nuttallii* is an evergreen Shrub growing to 0.9 m (3ft). See above for USDA hardiness. It is hardy to UK zone 6. It is in leaf all year, in flower from July to August. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It cannot grow in the shade. It prefers dry or moist soil.

pcista No member of this genus contains any toxins, all have more or less edible leaves. However, if grown with artificial fertilizers, they may concentrate harmful amounts of nitrates in their leaves.

ksakta Edible Parts: Leaves Seed **Edible Uses:** Leaves and stems - cooked[161]. It is usually cooked with wheat[177]. The leaves and stems can be used to add a salty flavour to other cooked foods[257]. **Seed** - cooked. Used in piñole or ground into a meal and used as a thickener in making bread or mixed with flour in making bread.

nrakta Western N. America - Manitoba to Saskatchewan, south to Nebraska, Colorado and Nevada **ksacta** Strongly saline and dry soils[60, 235].

propta Seed - sow April/May in a cold frame in a compost of peat and sand. The seed usually germinates in 1 - 3 weeks at 13°C[134]. Pot up the seedlings when still small into individual pots, grow on in a greenhouse for the first winter and plant out in late spring or early summer after the last expected frosts. Cuttings of half-ripe wood, July/August in a

frame. Very easy. Pot up as soon as they start to root (about 3 weeks) and plant out in their permanent positions late in the following spring[K]. Cuttings of mature wood of the current season's growth, November/December in a frame. Very easy. Pot up in early spring and plant out in their permanent position in early summer[K].

nwatta Requires a light or medium well-drained but not too fertile soil in a sunny position[11, 200]. Tolerates saline and very alkaline soils[200]. Succeeds in a hot dry position. Some modern works treat this species as a synonym of *Atriplex gardneri* aptera. This plant has more or less annual stems produced from a woody base[11]. Dioecious. Male and female plants must be grown if seed is required.

6.2.72 *Thymus serpyllum*

Wild Thyme

5 tlin 9 cyuc 4 kcak 5 tcan 3 dwat 0.1 m hkuc
htut cyutli kyucutp hwicli hrasjlut hpa7tli flatprikliwis
hpa7tmwatli xre7t hjonli

drutta *Thymus serpyllum* is an evergreen Shrub growing to 0.1 m (0ft 4in) by 0.3 m (1ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf all year, in flower from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Leaves Edible Uses: Tea Leaves - raw in salads or added as a flavouring to cooked foods[2, 11, 46, 61]. Thyme retains its flavour well in long slow cooking. If the leaves are to be dried, the plants should be harvested in early and late summer just before the flowers open and the leaves should be dried quickly[200]. An aromatic tea is made from the leaves[21].

tcanta Deodorant Disinfectant Disinfectant Essential Fungicide Repellent An essential oil from the leaves and flowering tops is used in perfumery, soaps, medicinally etc. It has fungicidal and disinfectant properties[4, 7]. About 150 grams of oil are obtained from 100 kilos of plant material[4]. The dried flowers are used to repel moths from clothing[4]. The growing plant is said to repel cabbage root fly[18, 20]. A good ground cover for a sunny position[197]. It needs weeding for the first year or so[197]. Plants are best spaced about 45cm apart each way[208]. Plants are only satisfactory when young or growing luxuriantly - they are apt to become bare in patches otherwise[208]. Summer flowers bring bees. Perennial groundcover for zone 2 firebreaks. The US government has created a system of firebreaks for areas prone to wildfires, these are separated into concentric zones surrounding buildings. Zone 2 is the second away from the house. These low-level groundcovers provide little fuel.

dwatta Anthelmintic Antirheumatic Antiseptic Antispasmodic Carminative Deodorant Diaphoretic Disinfectant Disinfectant Expectorant Sedative Tonic Wild thyme is a commonly used domestic remedy, being employed especially for its antiseptic properties and its beneficial effect on the digestive system. The whole plant is antelmintic, strongly antiseptic, antispasmodic, carminative, deodorant, diaphoretic, disinfectant, expectorant, sedative and tonic[4, 165, 200, 238, 254]. It is taken internally in the treatment of bronchitis, catarrh, laryngitis, flatulent indigestion, painful menstruation, colic and hangovers[238]. It is said to be effective in treating alcoholism[238]. It should not be prescribed for pregnant women[238]. Externally, it is applied to minor injuries, mastitis, mouth, throat and gum infections etc[238]. The plant can be used fresh at any time of the year, or it can be harvested as it comes into flower and either be distilled for the oil or dried for later use[238]. The seeds are used as a vermifuge[240]. Wild thyme contains all the medicinal properties of the more commonly used garden thyme (*T. vulgaris*), though in a lesser degree[4]. An essential oil distilled from the leaves is used in the treatment of stress-related conditions, though it can cause allergic reactions[238].

nrakta Europe, including Britain, from Sweden south and east to France, Hungary and Roumania. ksakta Dry stony

ground, open sandy heaths and grassland in East Anglia[7, 13, 17].

propta Seed - sow spring in a cold frame. Seed can also be sown in autumn in a greenhouse. Surface sow or barely cover the seed. Germination can be erratic. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Division in spring or autumn[200]. Larger divisions can be planted out direct into their permanent positions. We have found that it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame until they are growing away well. Plant them out in the summer or the following spring. Cuttings of young shoots, 5 - 8cm with a heel, May/June in a frame[200]. Cuttings of half-ripe wood, 5 - 8cm with a heel, July/August in a frame[200]. Layering.

nwatta Landscape Uses: Container, Ground cover, Rock garden, Seashore. Requires a light well-drained preferably calcareous soil in a sunny position[1, 200]. Succeeds in dry soils[4]. Grows well between stepping stones on paths, tolerating light treading[183, 200]. Succeeds on walls. Thymes dislike wet conditions, especially in the winter. A layer of gravel on the soil around them will help protect the foliage from wet soils[238]. Plants are hardy to about -15°C[200]. This is a very difficult genus taxonomically, the species hybridize freely with each other and often intergrade into each other[200]. This species is harvested commercially for its essential oil, known as 'wild thyme'[218]. Closely related to *T. praecox arcticus*, but this species is not so common in Britain[11]. It is a very polymorphic plant. A good companion for most other plants[54], it makes a very good carpeting plant for the rockery or between paving stones[1] and can also be grown in a short lawn[54]. The flowers are rich in nectar and are very attractive to honey bees[200], the plant also attracts butterflies[4, 7, 24]. Special Features: Attractive foliage, Edible, Fragrant foliage, Not North American native, Suitable for dried flowers. Heat Zone 9-1.

6.2.73 *Rumex scutatus*

Buckler-Leaved Sorrel, French sorrel

5 tlin 9 cyuc 4 kcak 2 tcan 1 dwat 0.6 m hkuc
hmimhtut cyutli hgattcup hwicli hrasjlutnyik hpa7tli flatprikliwis
hpa7tmwatli xre7t hjonli

drutta *Rumex scutatus* is a PERENNIAL growing to 0.6 m (2ft) by 0.6 m (2ft in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from June to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista Plants can contain quite high levels of oxalic acid, which is what gives the leaves of many members of this genus an acid-lemon flavour. Perfectly alright in small quantities, the leaves should not be eaten in large amounts since the oxalic acid can lock-up other nutrients in the food, especially calcium, thus causing mineral deficiencies. The oxalic acid content will be reduced if the plant is cooked. People with a tendency to rheumatism, arthritis, gout, kidney stones or hyperacidity should take especial caution if including this plant in their diet since it can aggravate their condition[238].

kcakta Edible Parts: Leaves Edible Uses: Leaves - raw or cooked[2, 4, 12, 14, 27, 33]. A delicious lemon-like flavour[183], most people find them overpowering if used in quantity, but they make a delightful addition to the salad bowl and can also be used as a pot-herb[K]. This species has less acid leaves and so is often preferred to sorrel (*R. acetosa*)[238]. The leaves should be used sparingly due to the oxalic acid content[4].

tcanta Dye The cultivar 'Silver Shield' makes a good, if rampant, ground cover beside paths and at the front of borders[238]. Although no specific mention has been made for this species, dark green to brown and dark grey dyes can be obtained from the roots of many species in this genus, They

do not need a mordant[168]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Antiscorbutic Astringent Diuretic Laxative RefrigerantThe leaves are antiscorbutic, astringent, diuretic, laxative and refrigerant[4, 238]. They are rarely used as a specifically medicinal plant.

nrakta Europe. Occasionally naturalized in Britain[17]. ksacta Old walls and mountain pastures[17, 244].

propta Seed - sow spring in a cold frame. Germination is rapid, the seedlings can be pricked out into individual pots when they are large enough to handle and are planted out in early summer[K]. It should also be possible to sow the seed in situ in mid spring[K]. Division in spring. Division is easy at any time in the growing season, though the plants establish better in the spring[K]. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta A very easily grown plant, succeeding in most soils but preferring a moist moderately fertile well-drained soil in a sunny position[200]. Prefers a rather dry soil[4, 27]. Established plants are drought tolerant[200]. Plants often self-sow freely in the garden[K]. Buckler-leaved sorrel is occasionally cultivated for its edible leaves[61, 105]. There are some named varieties that have been selected for their ornamental value[238]. A food plant for the caterpillars of many species of butterfly[30]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fleshy. Thick or swollen - fibrous or tap root [2-1].

6.2.74 Allium porrum

Leek, Garden leek

5 tlin 9 cyuc 4 kcak 0 tcan 2 dwat 0.9 m hkuc
htut cyutli tcup hwicli hrasjlutnyikfrip hpa 7tli flatprikllwisslip
hpa 7tmwatli xre 7t hjonli

drudda Allium porrum is a BULB growing to 0.9 m (3ft). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers moist soil.

pcista Although no individual reports regarding this species have been seen, there have been cases of poisoning caused by the consumption, in large quantities and by some mammals, of certain members of this genus. Dogs seem to be particularly susceptible[76].

7 Alphabetical Index

ckwatta Eatable Parts: Flowers Leaves RootEdible Uses: The leaves and long white blanched stem are eaten cooked[2, 16, 37, 183]. They can also be cut into thin slices and be added to salads[183]. A mild onion flavour with a delightful sweetness[183, K]. Bulb - raw or cooked. The bulb is produced in the plants second year of growth (that is, after it is normally harvested). The bulb is somewhat larger if the plant is prevented from flowering[K]. Flowers - raw. Used as a garnish on salads, though they are rather on the dry side and less pleasant than many other members of the genus[K].

tcanta RepellentThe juice of the plant is used as a moth repellent. The whole plant is said to repel insects and moles[20].

dwatta Anthelmintic Antiasthmatic Anticholesterolemic Antiseptic Antispasmodic Cholagogue Diaphoretic Diuretic Expectorant Febrifuge Stimulant Stings Stomachic Tonic VasodilatorThis species has the same medicinal virtues as garlic, but in a much milder and less effective form[238]. These virtues are as follows:- Garlic has a very long folk history of use in a wide range of ailments, particularly ailments such as ringworm, Candida and vaginitis where its fungicidal, antiseptic, tonic and parasitocidal properties have proved of benefit[218]. It is also said to have anticancer activity[218]. Daily use of garlic in the diet has been shown to have a very beneficial effect on the body, especially the blood system and the heart. For example, demographic studies suggest that garlic is responsible for the low incidence of arteriosclerosis in areas of Italy and Spain where consumption of the bulb is heavy[222]. The bulb is said to be anthelmintic, antiasthmatic, anticholesterolemic, antiseptic, antispasmodic, cholagogue, diaphoretic, diuretic, expectorant, febrifuge, stimulant, stomachic, tonic, vasodilator[4, 9, 14, 21, 46, 165]. The crushed bulb may be applied as a poultice to ease the pain of bites, stings etc[4, 9, 14, 21].

nrakta Original habitat is obscure. ksacta Not known in wild.

propta Seed - for an early crop, or for larger plants, sow the seed in early spring in a greenhouse and plant out in May. For smaller or later plants, sow April in an outdoor seedbed and plant out as space permits in July or even August.

nwatta Prefers a sunny position in a light well-drained soil[1] but succeeds in most soils[16]. Grows well in heavy clay soils. Prefers an open situation[1, 37]. Does best in a soil that was well fed for a previous crop[1]. Tolerates a pH in the range 5.2 to 8.3. The leek is a widely cultivated vegetable, there are many named varieties[183]. Young plants are often planted quite deeply in the soil (8 - 10cm deep) in order to blanch the lower stem, it is also a common practice to earth up the growing plants in order to blanch right the way up the stems. Whilst this does make the stems more tender, it also results in a loss of minerals and vitamins. Although commonly treated as a biennial, this plant is a true perennial, perennating by means of small lateral growths and often developing a roundish bulb at the base of the main growth[1]. A relatively slow-growing plant, it can be interplanted with faster maturing species such as lettuces[201]. The bulbs should be planted fairly deeply[1]. Grows well with most plants, especially roses, carrots, celery, celariac, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233].

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