

Plants For a Future 2021CE

Hardiness Zone 2, Acidic, Sandy Soil

pfaf.org

2021

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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 /ʃ/ "sh", d /d/, e /e/, f /f/, g /g/, h /h/, i /i/, j /ʒ/ "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 /ɹ/ (low tone), 6 /ə/ "uh", 7 /ɹ/ (high tone).

1.2 vocabulary

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

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

hgat /hgat/ drought (tolerant), kyuc /kju/ dry, tcup /tʃup/ damp, hja7n /h3a.n/ 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.t/ topsoil.

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

fyif /fjif/ self (fertile), xre7t /ʒre.t/, nyanhjen /njanh3en/ male-female (dioecious, distinct male and female plants), hjon /h3on/ sex.

hmuc /hmu/ purpose, pcis /pʃis/ danger, trot /trot/ temperature, prop /prop/ fertile, tcan /tʃan/ other, hyum /hjum/ uses, dwat /dwat/ medicine, drut /drut/ description, kcac /kʃe/ region, tfo2n /tfo.n/ nitrogen-fixing, xlutkfam /ʒlut.kfam/ plant quantity, bwon /bwon/ bean, mran /mran/ corn/grain non-nitrogen-fixing plant, nrak /nrak/ continent (of origin), ksac /ksa/ circumstances/habitat.

2 hmuctrotkcec, tcup hmuchwic, 3 kskancak, hras hmuchpa7t, flat hmuchpa7tmwat, 36 xlutkfam.

2 1 lin

2.0.1 *Pinus cembra sibirica*

Siberian Pine

1 tin 6 cyuc 4 kcaak 3 tcan 2 dwat 30 m hkcuc
htut cyutli hgatykyuctup 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 hardness. 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].

proppa 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].

nwtawa 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].

2.0.2 *Pinus contorta*

Beach Pine, Lodgepole pine, Bolander beach pine, Beach pine, Sierra lodgepole pine, Yukon pine, Shor
1 tin 7 cyuc 3 kcaak 0 tcan 2 dwat 15 m hkcuc
htut cyutli hgatykyuctup hpa7n hwicli hyishrasjlut hpa7tli flatprik
hpa7tmwatli dyat hjonli

drutta *Pinus contorta* is an evergreen Tree growing to 15 m (49ft) by 8 m (26ft) at a fast rate. See above for USDA hardness. It is hardy to UK zone 7. It is in leaf all year, in flower in May, and the seeds ripen from January to February. 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 and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral 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 The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].

kcaakta Edible Parts: Inner bark Sap Seed Edible Uses: Condiment Gum Inner bark - raw or cooked[2, 94, 105, 161, 257]. It can be used fresh or dried. It is mashed into a pulp and made into cakes then baked[94]. Harvested in early spring, the taste is not unpleasant, but it develops a strong taste of turpentine as the season advances[2]. The inner bark is ready to harvest when the male cones are producing pollen[257]. A famine food, it is only used when all else fails. Sap - collected in spring and used as a drink[161, 177]. Seed - raw or cooked[257]. A gum is made from the pitch obtained from the trunk. It is allowed to harden and used for chewing[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 Pitch String Waterproofing Wood A tan or green dye is obtained from the needles[168]. The roots have been braided by the N. American Indians to make a rope[226]. 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 pitch obtained from this tree is used for waterproofing canoes, baskets, shoes etc and as a glue[64, 99, 226, 257]. It has also been used to preserve wood, baskets etc[257]. The pitch is not a commercially important crop[64]. 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 tap-

ping 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 - straight but coarse-grained, light, hard, strong, brittle[60, 82]. It varies from light and soft to hard and heavy[229]. Easily worked, it is used for general construction, posts, poles, pulp etc[60, 82, 99, 171, 226, 229]. It makes a good fuel, burning well even when green because it is rich in pitch[99, 226].

dwatta Antiseptic Blood purifier Cathartic Diuretic Pectoral Poultice Salve TB Tonic VD VulneraryBeach pine was widely employed medicinally by several native North American Indian tribes who used it especially for its antiseptic and healing properties on wounds, infections etc, and also for its beneficial effects upon the chest and lungs[257]. It is little, if at all, used in modern herbalism. The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient, vermifuge and vulnerary[4, 257]. It is a valuable remedy when taken internally in the treatment of kidney and bladder complaints and can be used both internally and externally in the treatment of rheumatic affections[4, 257]. It is also used in treating diseases of the mucous membranes and respiratory complaints[4, 257]. Externally it is used in the form of liniment plasters and poultices in treating a range of skin complaints, wounds, boils etc[4, 257]. A decoction of the young shoots has been used in the treatment of stomach pains[257]. The young buds have been chewed in the treatment of a sore throat[257]. The inner bark has been eaten as a blood purifier, diuretic and cathartic[257]. A decoction has been used as a tonic and in the treatment of coughs, colds, consumption and gonorrhoea[257].

nrakta Western N. America - Alaska to California. ksacta Coastal dunes and sphagnum covered bogs to montane dry or moist areas[60, 82]. Trees growing inland are much larger than those growing near the coast[60].

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:Alpine garden, Screen, Seashore, Specimen, Woodland garden. Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Tolerates water-logged soils[81]. Succeeds in exposed maritime positions[49, 81]. Established plants tolerate drought[200]. The coastal form of this species is a very fast growing tree, especially when young, with new growth of 1 metre or more per year[185]. The forms from coastal Washington and Oregon do best in Britain. The subspecies *P. contorta latifolia* is normally slower growing than the species type though it is sometimes faster in some inland sites at higher altitudes[185]. New growth takes place from mid-April until early July[185]. Trees are long-lived, with specimens 600 years old recorded[229]. Extensively cultivated for timber in N. Europe[50, 200], this is an aggressive colonizing species that can form huge pure stands following a forest fire or clear-felling an area for timber[226]. Trees can be shrubby in habit when they are grown on poor sites[200]. Leaf secretions inhibit the germination of seeds, thereby reducing the amount of plants that can grow below

the tree[18]. There are some named forms, selected for their ornamental value[188]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. This species hybridises in the wild with *P. banksiana* where their ranges overlap[226]. Trees come into flower at an early age, usually between 6 and 10 years[229]. Good seed crops are produced every 1 - 3 years[229]. The cones are 2 - 5cm long[82], they open and shed their seed whilst still attached to the tree[226], though many of the cones will remain unopened on the tree, preserving the vitality of the seeds until they are stimulated to open by excessively hot weather or a forest fire[82, 229]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: North American native.

3 2 tlin

3.1 bwon

3.1.1 Caragana arborescens

Siberian Tea Tree, Siberian peashrub
tfo2n 2 tlin 7 cyuc 5 ckak 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].

kcakta Edible Parts: Oil Seed SeedpodEdible Uses: OilSeed - 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 stabilizationA 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 EmmenagogueThe 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

ough 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: ProteinSucceeds in most well-drained soils, preferring full sun and a light sandy 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 kcaak 4 tcan 2 dwat 7 m hkuc
thtut cywlll hgatkuyctucp hwclli hyshras]lutnyik hpa7tli flat-
prklkwsliphsom 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 SeedEdible Uses: GumFruit - 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 WoodPlants 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 PectoralThe 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: Biomass 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 kcaak 4 tcan 0 dwat 2 m hkuc
htut cyutli hgatkyuctcup 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].

kcakta Edible Parts: Oil Seed Seedpod Edible Uses: Oil! The 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 Oil Shelterbelt Soil stabilization The 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].

3.1.4 Elaeagnus commutata

Silverberry

ttu2n 2 tlin 6 cyuc 3 kcaak 4 tcan 2 dwat 3 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlutnyik hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

drutta *Elaeagnus commutata* is a deciduous Shrub growing to 3 m (9ft) by 1.5 m (5ft) 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 July to September. 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 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: Fruit - raw or cooked[1, 2, 3, 43, 106]. Dry and mealy[11, 95, 172, 183]. Good when added to soups they also make an excellent jelly[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 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 Beads Companion Fibre Hedge Hedge Soap-Plants can be grown as a hedge in exposed positions, tolerating maritime exposure. They have a rather open habit, however, and so do not afford a lot of wind protection. Because they fix atmospheric nitrogen, they enrich the soil and so make a very good companion hedge in orchards etc[K]. The fibrous bark is used in weaving, it has been twisted to make strong ropes and has also been used to make blankets and clothing[99, 257]. Dried fruits are used as beads[99, 257]. The berries have been used to make a soap[257].

dwatta Cancer Salve VDA strong decoction of the bark, mixed with oil, has been used as a salve for children with frostbite[257]. A decoction of the roots, combined with sumac roots (*Rhus* spp.), has been used in the treatment of syphilis[257]. This medicine was considered to be very poisonous and, if you survived it, you were likely to become sterile[257]. 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 N. America - Quebec to Alaska and south to Utah, S. Dakota and Minnesota.. ksacta Dry calcareous slopes[43, 184].

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. 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]. Division of suckers during the dormant season[3, 11]. The larger suckers can be planted out direct into their permanent positions, but it is probably best to pot up smaller suckers and grow them on in a cold frame until they are established.

nwatta An easily grown plant, it succeeds in most soils that are well-drained[200], though it dislikes shallow chalk soils[98]. This last report conflicts rather with the record of

its natural habitat, it should grow well on chalk[K]. Prefers a light sandy soil that is only moderately fertile, succeeding in poor and dry soils[11, 200]. Requires a position in full sun[11, 200]. Plants are very drought and wind resistant[1, 11, 200]. A very hardy plant, tolerating temperatures down to about -40°C[184]. However, plants prefer a continental climate and are liable to be cut back in severe winters in Britain mainly because the wood is not fully ripened in our cooler summers. A moderately fast-growing plant[202]. The small flowers are deliciously scented[245]. This species does not normally require pruning but the plant can regenerate from very old wood and so can be cut back severely if required[202]. Plants resent root disturbance and should be placed in their permanent positions as soon as possible[202]. 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%. Often confused with *E. angustifolia* even though it is very distinct[50]. Plants produce suckers quite freely, often sending them up at some distance from the plant[182, K]. This species is notably resistant to honey fungus[88, 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. The plant growth habit is multi-stemmed 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].

3.1.5 *Myrica pensylvanica*

Northern Bayberry

tfo2n 2 tlin 9 cyuc 3 kcak 3 tcan 1 dwat 3 m hkuc
hmmihtut cyutli kyuctup hwicli hrasljutnyik hpa7tli frusflat-
prikhsom hpa7tmwatli hjonli

drutta *Myrica pensylvanica* is a deciduous Shrub growing to 3 m (9ft) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 2. It is 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. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils and can grow in very acid and saline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista There is a report that some of the constituents of the wax might be carcinogenic[222].

kcakta Edible Parts: Fruit Edible Uses: Condiment Fruit - raw or cooked. The fruit is about 4mm in diameter and contains a single large seed[200]. There is very little edible flesh and this is of poor quality[K]. The leaves and fruit are used as a food flavouring in soups etc[62, 102, 183]. A bay leaf substitute, imparting a delicate aroma and subtle flavour[183]. The herb is removed before the food is served[183].

tcanta Dye Hedge WaxA wax covering on the fruit is extracted by scalding the fruit with boiling water and immersing them for a few minutes, the wax floats to the surface and is then skimmed off. The fruit is then boiled in water to extract the wax from the pulp and once more the wax is skimmed off. It is then strained through a muslin cloth and can be used to make aromatic candles[46, 106, 171]. Candles made from this wax are quite brittle but are less greasy in warm weather[213]. They are slightly aromatic, with a pleasant balsamic odour[245], and do not smoke when put out, making them much more pleasant to use than wax or tallow candles[213]. The wax is also used in making soaps[213].

A green dye is obtained from the leaves[106]. The plant is very hardy and can be grown as an informal hedge[200]. Carbon Farming - Industrial Crop: wax. Agroforestry Services: nitrogen.

dwatta The root bark is astringent and emetic in large doses[222]. A tea made from the leaves is used in the treatment of fevers and externally as a wash for itchy skin[222].

nrakta Eastern N. America. Possibly naturalized in Britain in the New Forest. ksacta Dry or wet sterile soil near the coast[43]. Coastal dunes, pine barrens, pine-oak forests, old fields, bogs, edges of streams, ponds, and swamps from sea level to 325 metres[270].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Barely cover the seed and keep it moist. Stored seed germinates more freely if given a 3 month cold stratification and then sown in a cold frame. Germination is usually good[78]. Prick out the seedlings into individual pots when they are large enough to handle and grow on in the cold frame for the first winter. Plant out in late spring or early summer[K]. Cuttings of half-ripe wood, 5 - 8cm with a heel, July/August in a frame. Pot up and overwinter in a cold frame. Fair to good percentage[78]. Cuttings of mature wood in November/December in a frame. Layering in spring[200]. Division of suckers in the dormant season. Plant them out direct into their permanent positions.

nwatta Agroforestry Services: Nitrogen Industrial Crop: Wax Management: Standard Regional CropIt is a temperate plant. Prefers a moist soil. Grows well in an open position in a well-drained soil in sun or light shade[200]. Thrives in any ordinary garden soil[11]. Prefers a lime-free loamy or peaty soil[1]. Does well in dry maritime sites[200]. Hardy to about -40°C[200]. Closely related to *M. cerifera* and perhaps no more than a harder northern form of it[11], it has larger fruits than *M. cerifera*[182]. Where their ranges overlap, *Myrica pensylvanica* hybridizes quite readily with both *M. cerifera* and *M. heterophylla*[270]. Tolerant of salt spread on roads[200]. Plants in this genus are notably resistant to honey fungus[200]. Many species in this genus have a symbiotic relationship with certain soil micro-organisms, these form nodules on the roots of the plants 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]. Carbon Farming - Climate: cold to warm temperate. Humidity: humid. Cultivation: regional crop. Management: standard. 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 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 stoloniferous rooting from creeping stems above the ground [1-2].

3.1.6 *Shepherdia canadensis*

Buffalo Berry, Russet buffaloberry, Canada Buffaloberry

tfo2n 2 tlin 6 cyuc 3 kcak 3 tcan 2 dwat 2.5 m hkuc
hmmihtut cyutli hgatyuctup hwicli hyishrasljutnyik hpa7tli
flatprikliw hpa7tmwatli nyanhjen hjonli

drutta *Shepherdia canadensis* is a deciduous Shrub growing to 2.5 m (8ft 2in) 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 April, 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). The plant is not self-fertile. 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.

pcista The fruit contains low concentrations of saponins[101]. Although toxic, these substances are very poorly absorbed by the body and so tend to pass through without causing harm. They are also broken down by thorough cooking. Saponins are found in many plants, including several that are often used for food, such as certain beans. It is advisable not 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: Fruit Edible Uses: Fruit - raw or cooked[2, 3, 22, 46, 85, 101]. The fruit can also be dried and used like currants. A tart but pleasant flavour even before a frost, it becomes sweeter after frosts[62]. Another report says that the fruit is bitter and is dried, smoked or pressed into cakes[183]. The fruit was a favourite treat of the North American Indians, they would beat it in an equal quantity of water until a foam with a consistency of beaten eggs was formed. It was important that the berries were not allowed to come into contact with anything greasy since this would prevent it becoming foamy[256]. The foam would then be flavoured with a sweet food such as cooked quamesh bulbs or other fruits and then served as a special treat in feasts etc. The taste is bitter sweet and is not always enjoyed the first time it is eaten, though it normally grows on one. Nowadays sugar is used to sweeten it and the confection is called 'Indian ice cream'[183, 256]. The fruit should be used in moderation due to the saponin content[101]. The fruit is about 5mm in diameter[200].

tcanta Hair Repellent Soap Because of its saponin content, the fruit is a potential soap substitute. It is macerated in water to extract the saponins[172]. A decoction of the branches has been used as a hair tonic for dyeing and curling the hair[257]. The branches were harvested in mid summer, broken up and boiled for 2 - 3 hours in water, until the liquid looked like brown coffee. The liquid was decanted off and bottled without further treatment - it would store for a long time without deterioration. To use, the decoction was rubbed into the hair which was simultaneously curled and dyed a brownish colour[257]. The berries, the froth made from them, or a jelly of the fruit, have been eaten as an insect repellent[257]. It was said that mosquitoes were far less likely to bite a person who had eaten the fruit[257].

dwatta Birthing aid Cathartic Haemostatic Hypotensive Laxative Ophthalmic Poultice Skin Stomachic TB VDBuffalo berry was commonly employed medicinally by several native North American Indian tribes, who used it in the treatment of a range of complaints[257]. It is little, if at all, used in modern herbalism. A poultice of the bark, softened by hot water and mixed with pin cherry bark (*Prunus pensylvanica*), has been used to make a plaster or bandage for wrapping broken limbs[257]. An infusion of the bark has been used as a wash for sore eyes[257]. The roots are antihemorrhagic and cathartic[257]. An infusion of the roots has been used as an aid to childbirth and in the treatment of tuberculosis and the coughing up of blood[257]. A decoction of the stems has been used as a stomach tonic (it was also used to treat stomach cancer) and also in the treatment of constipation, high blood pressure and venereal disease[257]. A decoction of the stems and leaves has been used as a wash in the treatment of sores, cuts and swellings[257]. A decoction of the plant has been used externally as a wash and rub for aching limbs, arthritic joints, head and face sores[257]. The inner bark is laxative[257]. An infusion has been used in the treatment of constipation[257]. The berries have been eaten as a treatment for high blood pressure[257]. The fruit juice has been drunk in the treatment of digestive disorders[257]. It has also been applied externally in the treatment of acne and boils[257].

nrakta N. America - Newfoundland to Alaska, south to British Columbia, New York and New Mexico. **ksacta** Calcareous rocks, banks and sandy shores[43], usually in partial shade[85].

propta Seed - it must not be allowed to dry out[113]. It is best harvested in the autumn and sown immediately in a cold frame. Stored seed requires 2 - 3 months cold stratification[113]. Prick out the seedlings into individual pots once

they are large enough to handle. If sufficient growth is made it will be possible to plant them out in the summer, otherwise grow them on in a cold frame for their first winter and plant them out in the following spring or early summer. Cuttings of half-ripe wood, July/August in a frame sometimes work[113].

nwatta Landscape Uses: Erosion control, Hedge, Massing, Superior hedge. Succeeds in an ordinary well-drained moisture retentive soil[1, 3, 11]. Tolerates poor dry soils[200] and maritime exposure[182]. Established plants are drought resistant[182]. Plants can accumulate mercury when they are grown in polluted soils[172]. Rarely produces fruits in Britain[182]. Some named varieties have been developed for their ornamental value[200]. 'Xanthocarpa' has yellow fruits, 'Rubra' has red fruits[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]. Dioecious. Male and female plants must be grown if fruit and seed is required. 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. 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].

3.2 mran

3.2.1 Cucurbita maxima

Winter Squash

2 tlin 11 cyuc 5 kcaak 2 tcan 3 dwat m hkuc hmimhit cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik hpa7tmwatli fyif hjonli

drutta *Cucurbita maxima* is a 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 Oil The 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 Tonic Vermifuge The 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

onic[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].

3.2.2 Zea mays

Sweet Corn, Corn

2 tlin 11 cyuc 5 kcaak 3 tcan 3 dwat m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli hjonli

drutta Zea mays is a ANNUAL growing to 2 m (6ft 7in) at a fast rate. See above for USDA hardness. 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 StemEdible Uses: Coffee Oil OilSeed - 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 PaperA 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 Cholagogue Demulcent Diuretic Hypoglycaemic Hypotensive Lithontripic Stimulant Vasodilator WartsA decoction of the leaves and roots is used in the treatment of strangury, dysuria and gravel[218]. The corn silks are cholagogue, demulcent, diuretic, lithontripic, 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.

nwatta 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 kcaak 1 tcan 3 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli fyif hjonli

drutta Cucurbita moschata is a ANNUAL CLIMBER growing to 0.6 m (2ft) by 4 m (13ft 1in) at a fast rate. See above for USDA hardness. 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 SeedEdible Uses: OilFruit - 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 Rubus arcticus

Arctic Bramble, Arctic raspberry, Dwarf raspberry
2 tin 7 cyuc 5 kcaak 1 tcan 0 dwat 0.2 m hkuc
htut cyutli tcup hwicli hrasljutnyik hpa7tli frusflatprikhwis 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.

kcakta 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 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 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..

3.2.5 Brassica oleracea italica

Broccoli
2 tin 11 cyuc 5 kcaak 2 tcan 0 dwat 0.9 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikhwis hpa7tmwatli fyfjxre7t 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 LeavesEdible 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].

3.2.6 *Viburnum lentago*

Sheepberry, Nannyberry, Nannyberry *Viburnum*
2 tlin 8 cyuc 4 kcak 0 tcan 1 dwat 9 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
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: Fruit Edible 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 Wood The 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 Emmenagogue The 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 *Smilacina racemosa*

False Spikenard
2 tlin 8 cyuc 4 kcak 2 tcan 2 dwat 1 m hkuc
pcimhmit cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli fyfixre7t 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

maritime herb. 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 streambanks[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].

3.2.8 *Asparagus officinalis*

Asparagus, Garden asparagus

2 tlin 9 cyuc 4 kcaak 2 tcan 3 dwat 1.5 m hkc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikli-wissliphsom 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].

kcakta Edible Parts: Shoots Stem Edible Uses: CoffeeY-oung 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 Insecticide The plant contains asparagusic acid, which has nematocidal properties[238].

dwatta Antibiotic Antispasmodic Aperient Cancer Cardiac Demulcent Diaphoretic Diuretic Laxative Sedative Tonic Urinary Asparagus 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. ksacta 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 Vaccinium australe

Northern Blueberry

2 tlin 7 cyuc 4 kcaek 2 tcan 1 dwat 1.5 m hkuc

hmmihtut 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 CAstringent, 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 store-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].

3.2.10 Cucurbita argyrosperma

Cushaw Pumpkin

2 tlin 11 cyuc 4 kcaek 1 tcan 2 dwat 0.5 m hkuc

hmmihtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatpriklwis hpa7tmwatli fyif hjonli

drutta *Cucurbita argyrosperma* is an 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].

kcakta Edible Parts: Flowers Fruit Leaves Oil SeedEdible 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].

3.2.11 *Cucurbita pepo*

Pumpkin, Field pumpkin, Ozark melon, Texas gourd
2 tlin 11 cyuc 4 kcaak 2 tcan 3 dwat 0.6 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis
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 Poultry 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]. *ksakta* 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 sweet-corn and thornapple but they dislike growing near potatoes[18, 20, 201]. They also grow well with nasturtiums, mint, beans and radishes[201].

3.2.12 *Coriandrum sativum*

Coriander - Dhania - Cilantro, Coriander
2 tlin 11 cyuc 4 kcaak 4 tcan 4 dwat 0.5 m hkuc
hmimhtut cyutli kyuctuc hwicli hrasjlut hpa7tli flatprikhwis
wisslip hpa7tmwatli fyifxre7t hjonli

drutta *Coriandrum sativum* is an 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: Condition 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%

[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 1¼ 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 Antidiarrhoeal Antihalitosis Appetizer Aromatherapy Aromatic Carminative Depurative Expectorant Narcotic Stimulant Stomachic Coriander is a commonly used domestic 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]. ksacta 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].

3.2.13 Cornus canadensis

Creeping Dogwood, Bunchberry dogwood, Bunchberry
2 tlin 7 cyuc 4 kcaac 2 tcan 2 dwat 0.3 m hkuc
hmimhtu cyutli tcup hwlicl hrasljutnyikfrjp 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.

kcakta Edible Parts: Fruit Edible Uses: Pectin 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 Pectin The 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 Ophthalmic The 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[1]. 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 heathers[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 suffer-

ing from the heat. The Plant 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 *Anethum graveolens*

Dill
2 tlin 11 cyuc 4 ckak 2 tcan 3 dwat 0.8 m hkuc
htut cyutli tcup hwicli hrasjlut hpa7tli flatprklwis
hpa7tmwatli fyfxkre7t hjonli

drutta *Anethum graveolens* is an 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 'psychotroph' myristicine[218]. There are also reports that dill can cause photosensitivity and or dermatitis in some people[218]. Avoid dill oil during pregnancy.

kcakta 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 Insecticide The 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 Antihistosis Aromatic Carminative Diuretic Galactagogue Stimulant Stomachic Dill 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.

nwanta 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.

3.2.15 *Rubus chamaemorus*

Cloudberry

2 tlin 4 cyuc 4 ckak 2 tcan 1 dwat 0.3 m hkuc
htut cyutli tcuphja7n hwicli hrasjlutnyik hpa7tli frusflatprk
hpa7tmwatli nyanhjen hjonli

drutta *Rubus chamaemorus* is a PERENNIAL growing to 0.3 m (1ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from June 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 Bees, flies. 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 and can grow in very acid soils. It cannot grow in the shade. It prefers moist or wet soil.

kcakta Edible Parts: Flowers Fruit Edible Uses: Tea Fruit - raw or cooked[183, 257]. Sour but delicious, the fruit can be eaten out of hand or stewed, used in preserves, pies etc[183]. Rich in vitamin C[257]. The sweet fruit tastes like baked apples[207]. Flowers - raw. The fresh or dried leaves are used as a tea substitute.

tcanta Dye A purple to dull blue dye is obtained from the fruit[168]. This species is used in breeding programmes for the raspberry (*Rubus idaeus*) in order to improve the fruit flavour[317].

dwatta Febrifuge Infertility TB Vitamin CA decoction of the roots has been used as 'woman's medicine'[257]. A decoction of the root and lower stem has been used by barren women to try and become pregnant[257]. The root has been used in the treatment of coughs, fevers and consumption[257].

nrakta Northern Europe, including Britain, from Scandinavia south and east to Germany and N. Asia. ksacta Cool boggy places, often found amongst bilberries on hills and mountain sides, avoiding shade and calcareous soils.

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]. 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]. Avoids calcareous soils in the wild and is often found in boggy soils[17]. Considered to be a gourmet fruit, it is occasionally sold in speciality stores[183]. 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. 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].

3.2.16 Populus hybrids

Hybrid poplar

2 tlin 10 cyuc 3 kcaak 4 tcan 3 dwat 50 m hkuc

hmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli frusflat-prikhwissliphsom hpa7tmwatli hjonli

drutta Populus hybrids is a TREE growing to 50 m (164ft) by 30 m (98ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. The flowers are 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, very alkaline and saline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista See individual species.

ckakta Edible Parts: Inner bark Leaves Seed Edible

Uses: Tea Leaves are rich in protein and have a greater amino-acid content than wheat, corn, rice and barley[226]. Carbon Farming Solutions - Staple Crop: protein [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 Biomass Fodder Plant support Resin Shelterbelt-Like willows (*Salix* spp.), their close relatives, poplars are known for fast growth and rapid biomass accumulation. Most coppice well and are easy to propagate from cuttings [1-1]. Carbon Farming Solutions - Industrial Crop: biomass (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]. Agroforestry Services: wind-break, living trellis (Agroforestry is a land use management system in which trees or shrubs are grown around or among crops or pastureland). Fodder: bank. Other Systems: SRC, irreg. intercrop, strip intercrop. Commonly grown as wind-breaks. Intercropped with annuals across northern China. In Italy they are pruned to be living trellises for grape growth.

dwatta Antiinflammatory Antirheumatic Antiscorbutic Antiseptic Antitussive Cathartic Diuretic Expectorant Febrifuge Ophthalmic Skin Stimulant Tonic Some. See individual species. For example Balsam poplar has a long history of medicinal use. It was valued by several native North American Indian tribes who used it to treat a variety of complaints, but especially to treat skin problems and lung ailments[257]. In modern herbalism it is valued as an expectorant and antiseptic tonic. The leaf buds are antiscorbutic, antiseptic, diuretic, expectorant, stimulant, tonic[4, 46, 61, 165, 172]. The leaf buds are covered with a resinous sap that has a strong turpentine odour and a bitter taste[213]. They are boiled in order to separate the resin and the resin is then dissolved in alcohol[222]. The resin is a folk remedy, used as a salve and wash for sores, rheumatism, wounds etc[222, 257]. It is made into a tea and used as a wash for sprains, inflammation, muscle pains etc[222]. Internally, the tea is used in the treatment of lung ailments and coughs[222]. The buds can also be put in hot water and used as an inhalant to relieve congested nasal passages[213]. The bark is cathartic and tonic[4]. Although no specific mention has been seen for this species, the bark of most, if not all members of the genus contain salicin, a glycoside that probably decomposes into salicylic acid (aspirin) in the body[213, 238]. The bark

is therefore anodyne, anti-inflammatory and febrifuge. It is used especially in treating rheumatism and fevers, and also to relieve the pain of menstrual cramps[238]. A tea made from the inner bark is used as an eye wash and in the treatment of scurvy[222].

nrakta Origin: N. Temperate. Widely distributed throughout the northern temperate regions, ranging from North America through Eurasia and northern Africa. ksacta propta Seed. Cuttings

nwatta Agroforestry Services: Living trellis Agroforestry Services: Windbreak Fodder: Bank Global Crop Industrial Crop: Biomass Management: Coppice Management: Standard Other Systems: Irreg. Intercrop Other Systems: SRC Other Systems: Strip intercrop Staple Crop: Protein Climate: boreal to warm temperate. Humidity: semi-arid to humid. Native to much of the northern temperate region and thrive from boreal through warm temperate climates as well as tropical highlands. Some are adapted to semi-arid sites although most prefer humid conditions [1-1]. Carbon Farming Solutions - Cultivation: global crop. Management: standard, coppice (Describes the non-destructive management systems that are used in cultivation) [1-1].

3.2.17 Salix hybrids

Hybrid willows

2 tlin 11 cyuc 3 kcaak 5 tcan 3 dwat 25 m hkuc

htut cyutli tcupha7n hwicli hrasjlutnyik hpa7tli flatprikhwissliphsom hpa7tmwatli hjonli

drutta Salix hybrids is a deciduous Shrub growing to 25 m (82ft) by 15 m (49ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. The flowers are pollinated by Insects. 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 or wet soil.

pcista See individual species.

ckakta Edible Parts: Inner bark Leaves Edible Uses: See individual species. In some species the inner bark and leaves are edible.

tcanta Basketry Biomass Fencing Filter Fodder Soil stabilization Weaving Wood Wastewater treatment - converting wastewater to biomass fuel by taking up excess nutrients in water for fertilizer. A strong, light flexible wood used for basketry, fencing and natural building. Erosion control and bank stabilization along streams and rivers [1-1]. Carbon Farming Solutions - Industrial Crop: biomass (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]. Fodder: bank. The leaves are a good fodder for livestock. Other Systems: SRC. Dynamic accumulator.

dwatta Some. See individual species. Willow bark was the basis for aspirin development. Many cultures have used willow bark for pain relief, thanks to a compound in willow bark called salicin.

nrakta Origin: N. Temperate, Africa, S. America. A wide natural distribution from the tropics to the arctic zones and are extensively cultivated around the world. ksacta Found along streambanks and in wetlands. Willows survive in warm and cold weather zones, although most thrive in moist climates.

propta Seed

nwatta Fodder: Bank Industrial Crop: Biomass Management: Minor Global Crop Other Systems: SRC Climate: tropical highlands. Humidity: semi-arid to humid, aquatic. There are tree, shrub, and ground cover willows. Usually coppiced or pollarded when managing. Some coppiced willows have lived to 800 years. Easy to breed and hybridize. Willows are very cross-compatible, and numerous hybrids occur, both naturally and in cultivation. A well-known ornamental example is the weeping willow (*Salix × sepulcralis*), which is a hybrid of Peking willow (*Salix babylonica*) from China and white willow (*Salix alba*) from Europe. Breeding work has increased biomass yields 50% in the last few decades. European breeding emphasises *Salix viminalis* and four or five others while North America is based on *Salix purpurea* and others. Carbon Farming Solutions - Cultivation: minor global crop. Management: coppice (Describes

non-destructive management systems that are used in cultivation) [1-1].

3.2.18 *Betula pendula*

Silver Birch, European white birch, Common Birch, Warty Birch, European White Birch

2 tlin 6 cyuc 3 kcaek 5 tcan 3 dwat 20 m hkcuc
htut cyutli kyucutcp hwicli hyishrasjlutnyikfrip hpa7tli frusflatprikliwis hpa7tmwatli hjonli

drutta *Betula pendula* is a deciduous Tree growing to 20 m (65ft) by 10 m (32ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower in April, 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) and is pollinated by Wind. 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 and nutritionally poor soils. 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 dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista The aromatic and aliphatic hydrocarbons in birch tar are irritating to the skin. Do not use in patients with oedema or with poor kidney or heart functions [301]

kcakta Edible Parts: Flowers Inner bark Leaves Sap Edible Uses: Tea Inner bark - cooked or dried and ground into a meal[2, 15, 105]. It can be added as a thickener to soups etc or can be mixed with flour for making bread, biscuits etc. Inner bark is generally only seen as a famine food, used when other forms of starch are not available or are in short supply[115, 177, K]. Sap - raw or cooked. A sweet flavour. It is harvested in early spring, before the leaves unfurl, by tapping the trunk. It makes a pleasant drink[115]. It is often concentrated into a syrup by boiling off the water[2, 9, 13, 15, 177]. Between 4 and 7 litres can be drawn off a mature tree in a day and this will not kill the tree so long as the tap hole is filled up afterwards[115]. However, prolonged or heavy tapping will kill the tree[115]. The flow is best on sunny days following a frost. The sap can be fermented into a beer. An old English recipe for the beer is as follows- "To every Gallon of Birch-water put a quart of Honey, well stirr'd together; then boil it almost an hour with a few Cloves, and a little Limon-peel, keeping it well scumm'd. When it is sufficiently boil'd, and become cold, add to it three or four Spoonfuls of good Ale to make it work...and when the Test begins to settle, bottle it up . . . it is gentle, and very harmless in operation within the body, and exceedingly sharpens the Appetite, being drunk ante pastum." [269]. Young leaves - raw or cooked[15]. Young catkins[15]. No more details are given. A tea is made from the leaves[15, 161] and another tea is made from the essential oil in the inner bark[21].

tcanta Adhesive Besom Charcoal Compost Dye Essential Fibre Fungicide Hair Miscellany Paper Pioneer Polish Repellent Tannin Thatching Waterproofing Wood The bark is used to make drinking vessels, canoe skins, roofing tiles etc[115]. It is waterproof, durable, tough and resinous. Only the outer bark is removed, this does not kill the tree. It is most easily removed in late spring to early summer. A pioneer species, it readily invades old fields, cleared or burnt-over land and creates conditions suitable for other woodland trees to become established. Since it is relatively short-lived and intolerant of shade, it is eventually out-competed by these trees[17, 186]. A tar-oil is obtained from the white bark in spring. It has fungicidal properties and is also used as an insect repellent[4, 13, 100]. It makes a good shoe polish[61]. Another report says that an essential oil is obtained from the bark and this, called "Russian Leather" has been used as a perfume[245]. A decoction of the inner bark is used to preserve cordage[115], it contains up to 16% tannin[178, 223]. An oil similar to Wintergreen oil (obtained from *Gaultheria procumbens*) is obtained from the inner bark[21, 61]. It is used medicinally and also makes a refreshing tea[21]. The resin glands (the report does not say where these glands are found) are used to make a hair lotion[226]. A brown dye is obtained from the inner bark A glue is made from the sap[2, 9, 13, 15]. Cordage can be made from the fibres of the inner bark[115]. This inner bark can also be separated into thin layers and used as a substitute for oiled paper[4]. The young branches are very flexible and are used to make whisks, be-

soms etc[6]. They are also used in thatching [13, 100, 20] and to make wattles[4]. The leaves are a good addition to the compost heap, improving fermentation[14]. Wood - soft, light, durable. It is used for a wide range of purposes including furniture, tool handles, toys and carving[13, 100, 238]. A high quality charcoal is obtained from the bark. It is used by artists, painters etc[13]. The wood is also pulped and used for making paper[238].

dwatta Anticholesterolemic Antiinflammatory Antirheumatic Antiseborrheic Antiseptic Astringent Bitter Cholagogue Diaphoretic Diuretic Eczema Laxative Lithontripic Miscellany Skin Urinary Anti-inflammatory, cholagogue, diaphoretic[21, 165, 201]. The bark is diuretic and laxative[7]. An oil obtained from the inner bark is astringent and is used in the treatment of various skin afflictions, especially eczema and psoriasis[4, 238]. The bark is usually obtained from trees that have been felled for timber and can be distilled at any time of the year[238]. The inner bark is bitter and astringent, it is used in treating intermittent fevers[4]. The vernal sap is diuretic[4]. The buds are balsamic[7]. The young shoots and leaves secrete a resinous substance which has acid properties, when combined with alkalis it is a tonic laxative[4]. The leaves are anticholesterolemic and diuretic[7]. They also contain phytosides, which are effective germicides[7]. An infusion of the leaves is used in the treatment of gout, dropsy and rheumatism, and is recommended as a reliable solvent of kidney stones[4]. The young leaves and leaf buds are harvested in the spring and dried for later use[238]. A decoction of the leaves and bark is used for bathing skin eruptions[4]. Moxa is made from the yellow fungous excrescences of the wood, which sometimes swell out of the fissures[4]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Betula* species for infections of the urinary tract, kidney and bladder stones, rheumatism (see [302] for critics of commission E).

nrakta Most of Europe, including Britain, south and east to Morocco, W. Siberia and central Asia. ksacta Open woodland and heaths[17, 100]. Rarely found on chalk[17].

propta Seed - best sown as soon as it is ripe in a light position in a cold frame[78, 80, 113, 134]. Only just cover the seed and place the pot in a sunny position[78, 80, 134]. Spring sown seed should be surface sown in a sunny position in a cold frame[113, 134]. If the germination is poor, raising the temperature by covering the seed with glass can help[134]. 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. If you have sufficient seed, it can be sown in an outdoor seedbed, either as soon as it is ripe or in the early spring - do not cover the spring sown seed. Grow the plants on in the seedbed for 2 years before planting them out into their permanent positions in the winter[78, 80, 113, 134].

nwatta Landscape Uses: Firewood, Specimen. A very easily grown plant, it tolerates most soils including poor ones[1, 24], sandy soils[188] and heavy clays. It prefers a well-drained loamy soil in a sunny position[11, 200]. It is occasionally found on calcareous soils in the wild but it generally prefers a pH below 6.5, doing well on acid soils[186]. Fairly wind tolerant[200] though it becomes wind shaped when exposed to strong winds[K]. The silver birch is a very ornamental tree[1] with many named varieties[11, 200]. It also has a very wide range of economic uses. It is a fast growing tree, increasing by up to 1 metre a year, but is short-lived[17, 200]. It is often one of the first trees to colonize open land and it creates a suitable environment for other woodland trees to follow[17]. These trees eventually out-compete and shade out the birch trees[17, 186]. It makes an excellent nurse tree for seedling trees, though its fine branches can cause damage to nearby trees when blown into them by the wind. Trees take about 15 years from seed to produce their own seed[98]. Although closely related, it does not usually hybridize with *B. pubescens*[11]. It often hybridizes with *B. pubescens* according to another report[186]. A superb tree for encouraging wildlife, it has 229 associated insect species[24]. A good plant to grow near the compost heap, aiding the fermentation process[14, 20]. It is also a good companion plant, its root action working to improve the soil[14]. Trees are notably susceptible to honey fungus[200]. Special Features: Not North American native, Attractive flowers or blooms.

3.2.19 Betula pubescens

White Birch, Downy birch

2 tlin 9 cyuc 3 kcaek 5 tcan 3 dwat 20 m hkuc

htut cyutli kyuctcuphja7n hwicli hyshrasjlutnyikfrip hpa7tli frusflatprikliw hpa7tmwatli hjonli

drutta *Betula pubescens* is a deciduous Tree growing to 20 m (65ft) by 10 m (32ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 1. It is in flower in April, 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. It is noted for attracting wildlife. 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 and can grow in very acid soils. It cannot grow in the shade. It prefers dry moist or wet soil. The plant can tolerate strong winds but not maritime exposure.

pcista The aromatic and aliphatic hydrocarbons in birch tar are irritating to the skin. Do not use in patients with oedema or with poor kidney or heart functions [301]

kcaakta Edible Parts: Flowers Inner bark Leaves SapEdible Uses: Tealnnr bark - cooked or dried, ground into a powder then used with cereals for making bread etc[2, 15, 46]. Inner bark is generally only seen as a famine food, used when other forms of starch are not available or are in short supply[177, K]. Sap - raw or cooked. A sweet flavour[2, 15, 177]. Harvested in early spring, before the leaves unfurl, by tapping the trunk. The flow is best on sunny days following a heavy frost. The sap is often concentrated into a sugar by boiling off the water. Between 4 and 7 litres can be drawn off a mature tree in a day and this will not kill the tree so long as the tap hole is filled up afterwards[115]. However, prolonged or heavy tapping will kill the tree. A beer can be fermented from the sap. An old English recipe for the beer is as follows: "To every Gallon of Birch-water put a quart of Honey, well stirr'd together; then boil it almost an hour with a few Cloves, and a little Limon-peel, keeping it well scumm'd. When it is sufficiently boild'd, and become cold, add to it three or four Spoonfuls of good Ale to make it work...and when the Test begins to settle, bottle it up . . . it is gentle, and very harmless in operation within the body, and exceedingly sharpens the Appetite, being drunk ante pastum."[269]. Young leaves - raw or cooked[15, 177]. Young catkins[15]. No more details are given. A tea is made from the leaves[15] and another tea is made from the essential oil in the inner bark[21].

tcanta Adhesive Besom Charcoal Compost Dye Essential Fibre Fungicide Miscellany Paper Pioneer Polish Repellent Tannin Thatching Waterproofing WoodThe bark is used to make drinking vessels, canoe skins, roofing tiles etc. It is waterproof, durable, tough and resinous[11, 61]. Only the outer bark is removed, this does not kill the tree. It is most easily removed in late spring to early summer. The bark was pressed flat and stored until the following spring. When required for making canoes it would be heated over a fire to make it pliable for shaping to the canoe frame[257]. A pioneer species, it readily invades old fields, cleared or burnt-over land and creates conditions suitable for other woodland trees to become established. Since it is relatively short-lived and intolerant of shade, it is eventually out-competed by these trees[11, 186]. A tar-oil is obtained from the white bark in spring. It has fungicidal properties and is also used as an insect repellent[4, 14, 61, 100]. It makes a good shoe polish[61]. Another report says that an essential oil is obtained from the bark and this, called 'Russian Leather' has been used as a perfume[245]. A glue is made from the sap. Cordage can be made from the fibres of the inner bark. This inner bark can also be separated into thin layers and used as a substitute for oiled paper[4]. A decoction of the inner bark is used to preserve cordage, it is rich in tannin. The bark contains up to 16% tannin[223]. A brown dye is obtained from the inner bark. An oil similar to Wintergreen oil (obtained from *Gaultheria procumbens*) is obtained from the inner bark[21, 61]. It is used medicinally and also makes a refreshing tea[21]. The young branches are very flexible and are used to make whisks, besoms etc[6]. They are also used in thatching and to make wattles[4]. The leaves are a good addition to the compost heap, improving fermentation[20]. A black paint is obtained from the soot of the plant[61]. A high quality charcoal is obtained from the bark. It is used by artists, painters etc. Wood - soft, light, durable. It is used

for a wide range of purposes including furniture, tool handles, carving, toys etc[100, 238]. It is a source of charcoal that is used by artists and is also pulped and used for making paper[238].

dwatta Antirheumatic Antiseborrheic Astringent Bitter Diaphoretic Diuretic Eczema Lithontripic Miscellany Skin UrinaryAnti-inflammatory, cholagogue, diaphoretic[21, 165, 201]. The bark is diuretic and laxative[7]. The inner bark is bitter and astringent, it is used in treating intermittent fevers[4]. An oil obtained from the inner bark is astringent and is used in the treatment of various skin afflictions, especially eczema and psoriasis[4, 238]. The bark is usually obtained from trees that have been felled for timber and can be distilled at any time of the year[238]. The buds are balsamic[7]. The young shoots and leaves secrete a resinous substance which has acid properties, when combined with alkalis it is a tonic laxative[4]. The leaves are anticholesterolemic and diuretic[7]. They also contain phytosides, which are effective germicides[7]. An infusion of the leaves is used in the treatment of gout, dropsy and rheumatism, and is recommended as a reliable solvent of kidney stones[4]. The young leaves and leaf buds are harvested in the spring and dried for later use[238]. A decoction of the leaves and bark is used for bathing skin eruptions[4]. The vernal sap is diuretic[4]. The boiled and powdered wood has been applied to chafed skin[257]. Moxa is made from the yellow fungus excrescences of the wood, which sometimes swell out of the fissures[4]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Betula* species for infections of the urinary tract, kidney and bladder stones, rheumatism (see [302] for critics of commission E).

nraakta Most of Europe, including Britain, east to W. Siberia and central Asia. ksacta Open woodland and heaths, usually on acid soils, from sea level to 830 metres[1, 17, 100].

propta Seed - best sown as soon as it is ripe in a light position in a cold frame[78, 80, 113, 134]. Only just cover the seed and place the pot in a sunny position[78, 80, 134]. Spring sown seed should be surface sown in a sunny position in a cold frame[113, 134]. If the germination is poor, raising the temperature by covering the seed with glass can help[134]. 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. If you have sufficient seed, it can be sown in an outdoor seedbed, either as soon as it is ripe or in the early spring - do not cover the spring sown seed. Grow the plants on in the seedbed for 2 years before planting them out into their permanent positions in the winter[78, 80, 113, 134].

nwatta Succeeds in a well-drained light loamy soil in a sunny position[11, 200]. Grows well in heavy clay soils. Tolerates a wet position[11, 24], succeeding in poorly drained soils[186]. Fairly wind tolerant[200]. Prefers an acid soil. A very ornamental tree and fast growing, capable of growing 1 metre a year but it is short-lived[186]. It is one of the first trees to colonize open land and it creates a suitable environment for other woodland trees to follow[11]. These trees eventually shade out the birch trees[186]. Trees take about 15 years from seed to produce their own seed[98]. Although closely related, it does not usually hybridize with *B. pendula*[11]. It hybridizes freely with *B. pendula* according to another report[186]. A superb tree for encouraging wildlife, it has over 200 associated insect species[24, 30]. A good plant to grow near the compost heap, aiding the fermentation process[14, 20]. It is also a good companion plant, its root activity working to improve the soil[14]. Trees are notably susceptible to honey fungus[200].

3.2.20 Vitis riparia

Riverbank Grape

2 tlin 6 cyuc 3 kcaek 2 tcan 0 dwat 15 m hkuc

hmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flat-prikliw hpa7tmwatli xre7t hjonli

drutta *Vitis riparia* is a deciduous Climber growing to 15 m (49ft 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 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 Insects. Suitable for: light

alkaline), 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.

kcakta Edible Parts: Fruit Leaves Sap Shoots Edible Uses: Fruit - raw or dried for later use[22, 46, 62, 161, 183]. Juicy and somewhat acid[183]. The taste is best after a frost[101]. The fruit is about 6 - 12mm in diameter[200] and is carried in fairly large bunches[K]. Leaves - cooked[55, 159]. Young leaves are wrapped around other foods and then baked, they impart a pleasant flavour. Young tendrils - raw or cooked[55, 85, 159]. Sap - raw[101, 161]. A sweet flavour, it is used as a drink[183]. The sap can be harvested in the spring and early summer, though it should not be taken in quantity or it will weaken the plant[K].

tcanta Dye Rootstock A yellow dye is obtained from the fresh or dried leaves[168]. The plant is used as a rootstock for the common grape, *V. vinifera*, especially in areas where phyloxera disease is prevalent[183].

nrakta Eastern and Central N. America. Locally naturalized in Europe[50]. ksacta Riverbanks, bottomlands, rich thickets and woodland margins[43, 62].

propta 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 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]. The young growth in spring can be damaged by late frosts. Plants climb by means of tendrils[182]. They grow particularly well into elm trees[18]. Any pruning should be carried out in winter when the plants are dormant otherwise they bleed profusely[182, 200]. Occasionally cultivated for its edible fruit in N. America[46], there are some named varieties[183]. 'Brandt' is of uncertain parentage, probably involving this species, it usually ripens its fruit in S.E. England[11]. Resistant to Phyloxera disease, a disease that almost destroyed the European grape crops. This species can be used as a rootstock 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[183]. The flowers are powerfully scented of mignonette[245]. 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. Woody. Growth habit is a single or multiple shooting vine from a crown [1-2].

3.2.21 *Viburnum trilobum*

American Cranberry, Highbush Cranberry, Cranberrybush, American Cranberrybush Viburnum

2 tlin 7 cyuc 3 kcak 0 tcan 1 dwat 3 m hkuc
hmimhtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flat-prikrlwis hpa7tmwatli fyfxre7t hjonli

druuta Viburnum trilobum is a deciduous Shrub growing to 3 m (9ft 10in) at a medium rate. See above for USDA hardness. It is hardy to UK zone 2 and is not frost tender. It is in flower in June, 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. 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 and can tolerate drought.

pcista Large quantities of the fruit can cause vomiting and diarrhoea[10, 65]. The fruit is of very low or zero toxicity, it only causes mild upsets when eaten unripe or in large quantities[65, 76].

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[3, 11, 161, 257]. Juicy but acid, the taste is best after a frost[62, 101, 102]. The fruits are rich in vitamin C, they are an excellent substitute for cranberries and are used in preserves, jams etc[183]. A jam made from the fruit has a very pleasant flavour that goes well in a porridge[K]. The fruit is about 8mm in diameter and contains a single large seed[200].

dwatta Emetic Febrifuge Laxative Stomachic Vitamin Women's complaints An infusion of the roots has been used in the treatment of prolapse of the uterus[257]. A decoction has been given to babies with fevers[257]. A decoction of the branches has been used to treat a fallen womb after birth[257]. The bark is laxative[257]. An infusion of the roots has been used to make a person vomit in the treatment of bad blood and fevers[257]. An infusion of the inner bark has been used to treat stomach cramps[257].

nrakta N. America - Newfoundland to British Columbia, New Jersey, Michigan, Iowa, South Dakota and Oregon. ksacta Stream banks[62]. Low moist ground[235].

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: Foundation, Massing, Screen, Specimen, Winter interest. An easily grown plant, it succeeds in most soils but is ill-adapted for poor soils and for dry situations[1]. It grows well in heavy clay soils. Established plants are drought tolerant[160]. 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]. This species is considered by some botanists to be no more than a superior fruiting form of *V. opulus* that was taken to America by early settlers[11]. Occasionally cultivated for its edible fruit, there are some named varieties[183]. The fruit is very attractive to birds[160]. Some reports say that this species is self-fertile[17, 200] whilst others say it is self-incompatible[11]. It is probably best to grow at least two different cultivars in order to produce fruit and fertile seed[11, 200]. Special Features: North American native, Attracts butterflies, Blooms are very showy. 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 flat with shallow roots forming a plate near the soil surface [1-2].

3.2.22 *Viburnum cassinoides*

Witthe Rod, Appalachian Tea, Witherod Viburnum, Witherod, Wild Raisin Viburnum

2 tlin 8 cyuc 3 kcak 0 tcan 1 dwat 2.5 m hkuc

drutta Ribes alpinum 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 2 and is not frost tender. It is in flower from April to May, and the seeds ripen 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 Flies, bees. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

drutta Viburnum cassinoides is a deciduous Shrub growing to 2.5 m (8ft 2in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower in June, and the seeds ripen in 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 and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

dwatta Antispasmodic Diaphoretic Febrifuge Mouthwash TonicThe bark and root bark is antispasmodic, diaphoretic, febrifuge and tonic[257]. An infusion has been used to treat recurrent spasms, fevers, smallpox and ague[257]. The infusion has also been used as a wash for a sore tongue[257].

nrakta Eastern N. America - Newfoundland to Manitoba, Minnesota, New Jersey, Georgia and Alabama. ksacta Thickets, clearings, swamps and borders of woods[43].

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, Hedge, 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 dislikes chalk, growing best on lime-free soils[3, 182]. Prefers a deep rich loamy soil in sun or semi-shade[11, 200]. Best if given shade from the early morning sun in the spring[200]. This species is closely allied to *V. nudum*[11]. Plants are self-incompatible and need to grow close to a genetically distinct plant in the same species in order to produce fertile seed[11, 200]. There is at least one named variety, selected for its ornamental value[200]. 'Nanum' has a dwarf habit and the leaves have a rich autumn colouring[200]. Special Features: North American native, Fragrant flowers, 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].

3.2.23 Ribes alpinum

Alpine Currant

2 tlin 7 cyuc 3 kcaak 4 tcan 0 dwat 1.2 m hkuc
hmmihmtut cyutlii tcup hwiclii hyishrasjlutnyik hpa7tli flatprikli-wis hpa7tmwatli nyanhjen hjonli

drutta Ribes alpinum 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 2 and is not frost tender. It is in flower from April to May, and the seeds ripen 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 Flies, 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 can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[105]. Sweet and not very acid, but less palatable than *R. rubrum*, the red currant[2]. An insipid fruit[100], it is not palatable[1, 11]. The only fruits we have eaten have been good size red currants with a fair flavour[K]. The fruit is about 5mm in diameter and can be freely borne when male and female plants are grown[K].

tcanta Hedge HedgeThe cultivar 'Green Mound' makes a good dwarf hedge[182]. Plants can be grown as a tall ground cover when spaced about 2 metres apart each way[208]. The cultivars 'Aureum' and 'Pumilum' are smaller growing and should be spaced about 1 metre apart[208].

nrakta Europe, including Britain, from Scandinavia south and east to N. Africa, Italy, Montenegro, Bulgaria ksacta Cliffs and rocky woods on limestone[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 0 - 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, July/August in a frame[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 Landscape Uses:Erosion control, Foundation, Ground cover, Massing, Rock garden, Seashore. Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. This species succeeds on poor soils[11]. Does well in shade though it does not fruit so well in such a position[11]. A very hardy plant, tolerating temperatures down to about -25°C[184]. A number of named varieties have been developed for their ornamental value. The flowers are sweetly fragrant[208]. Plants are dioecious. At least one male plant must be grown in the vicinity of up to 5 females if fruit is required. 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]. Special Features: Not North American native, Inconspicuous flowers or blooms.

3.2.24 Tagetes erecta

African Marigold, Aztec marigold, Big Marigold, American Marigold

2 tlin 11 cyuc 3 kcaak 3 tcan 3 dwat 1 m hkuc
htut cyutli kyucup hwanli hrasjlutnyikfrip hpa7tli flatprikli-wis hpa7tmwatli xre7t hjonli

drutta Tagetes erecta is a ANNUAL growing to 1 m (3ft 3in) by 0.4 m (1ft 4in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is frost tender. 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), 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 dry or moist soil.

kcakta Edible Parts: FlowersEdible Uses: Colouring CondimentThe petals of the flowers of some varieties can be eaten[183]. The fresh receptacle is eaten by children[272]. A yellow dye obtained from the flowers can be used as a saf-iron substitute for colouring and flavouring foods[183]. The plant is used as a condiment[177]. (This probably refers to the use of the flowers as an edible dye)

Utes:Border, Container, Foundation, Massing, Seashore, Specimen. Secretions from the roots of growing plants have an insecticidal effect on the soil, effective against nematodes and to some extent against keeled slugs. These secretions are produced about 3 - 4 months after sowing[200]. The flower petals also have nematocidal properties[218]. The growing plant is also said to repel insects and can be grown amongst crops such as potatoes and tomatoes. A yellow dye is obtained from the flowers[169, 257]. Dynamic accumulator.

dwatta Anthelmintic Aromatic Carminative Digestive Diuretic Dysentery Eczema Emmenagogue Laxative Ophthalmic Sedative Skin StomachicThe whole herb is anthelmintic, aromatic, digestive, diuretic, emmenagogue, sedative and stomachic[61, 238]. It is used internally in the treatment of indigestion, colic, severe constipation[238], coughs and dysentery[218]. Externally, it is used to treat sores, ulcers, eczema, sore eyes and rheumatism[218, 238, 257, 272]. The leaves are harvested as required for immediate use during the growing season, whilst the flowering plant can be dried and stored for later use[238]. A paste of the leaves is applied externally to treat boils, carbuncles and earaches[272]. The flowers are carminative, diuretic and vermifuge[272]. A decoction is used to treat colds, and mumps[218]. It is applied externally to treat skin diseases, conjunctivitis and sore eyes[218, 272]. The root is laxative[272].

nrakta Southern N. America - Mexico. ksacta Grows in the pine-oak forest zone[181]. A garden escape in the USA where it grows along the sides of roads[43].

propta Seed - sow March in a greenhouse. Only just cover the seed. Germination usually takes place within 2 weeks. When they are large enough to handle, prick the seedlings out into individual pots and plant them out after the last expected frosts.

nwatta Requires a well-drained moderately fertile soil in a sunny position[200]. Grows well in heavy clay soils and in sandy soils[188]. Although not very frost resistant, it can be grown as a tender annual in Britain, sowing the seed in a greenhouse in the spring and planting out after the last expected frosts. The flowers are often sold in local markets in Nepal and used as an offering to the Gods[272]. A number of named forms have been developed for their ornamental value[183]. The cultivar 'Yellow Climax' has mild flavoured edible flowers that can be used as colourful garnishes[183]. All parts of the plant emit an unpleasant smell similar to that of stale urine when they are bruised[245]. Removing dead flowers before the seed is formed will extend the flowering season[188]. Plants are prone to attacks by slugs, snails and botrytis[188]. Special Features: North American native, Fragrant foliage, Suitable for cut flowers, Suitable for dried flowers.

3.2.25 *Vaccinium angustifolium laevifolium*

Low Sweet Blueberry
2 tlin 6 cyuc 3 kcaak 0 tcan 0 dwat 0.6 m hkuc
hmmihtut cyutli kyucup hwicli hrasjutl hpa7tli frusflat
hpa7tmwatli xre7t hjonli

drutta *Vaccinium angustifolium laevifolium* is a deciduous Shrub growing to 0.6 m (2ft) by 0.7 m (2ft 4in). See above for USDA hardiness. It is hardy to UK zone 2. 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 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.

kcaakta Edible Parts: FruitEdible Uses: TeaFruit - raw, cooked or used in preserves etc[2, 161, 183]. A very sweet pleasant flavour with a slight taste of honey[11, 43, 183]. Largely grown for the canning industry. The fruit can be dried and used like raisins[62]. The fruit is about 12mm in diameter[200]. A tea is made from the leaves and dried fruits[101].

nrakta North-eastern N. America. ksacta Dry open barrens, peats and rocks[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 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].

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]. A very hardy plant, tolerating temperatures down to about -40°C[200]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. Cultivated for its edible fruits, there are some named varieties[1, 183]. It succeeds in cold northerly locations such as Maine in N. America[183] and in central Sweden. However, it is said to have little or no value as a fruit crop in Britain[11]. This subspecies is more commonly grown in Britain than the typical form[200]. Plants in this genus are notably resistant to honey fungus[200].

3.2.26 *Calendula officinalis*

calendula, Pot Marigold
2 tlin 11 cyuc 3 kcaak 4 tcan 5 dwat 0.6 m hkuc
hmmihtut cyutli tcup hwicli hyshrasjutnyik hpa7tli frusflat
prikhwisslip hpa7tmwatli hjonli

drutta *Calendula officinalis* is an ANNUAL growing to 0.6 m (2ft) by 0.5 m (1ft 8in) 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 November, and the seeds ripen from August to November. 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, 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.

pcista Low potential for sensitization and contact dermatitis. Possible allergies if allergic to daisy family plants. Topical use may cause rash [301].

kcaakta Edible Parts: Flowers LeavesEdible Uses: Colouring TeaLeaves - raw[14, 21]. When eaten they first of all impart a viscid sweetness, followed by a strong penetrating taste of a saline nature[4]. They are very rich in vitamins and minerals and are similar to *Taraxacum officinale* (Dandelion) in nutritional value[179]. Fresh petals are chopped and added to salads[183]. The dried petals have a more concentrated flavour and are used as a seasoning in soups, cakes etc[183]. High in vitamins A and C[218]. An edible yellow dye is obtained from the petals[46]. A saffron substitute[21], it is used to colour and flavour rice, soups etc[2, 14, 27, 33]. It is also used as a hair rinse, adding golden tints to brown or auburn hair[201]. A tea is made from the petals and flowers, that made from the petals is less bitter[183]. There is no record of the seed being edible, but it contains up to 37% protein and 46% oil[218].

tcanta Compost Cosmetic Dye Essential Repellent Weather forecastingThe growing plant acts as an insect deterrent[14], it reduces the soil eelworm population[24]. The flowers are used cosmetically. They can be used in skin lotions and when added to hair shampoos will lighten the hair colour[244]. The flowers are an alternative ingredient of 'Quick Return' 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 yellow dye is obtained from the boiled flowers[2, 4, 46]. An essential

oil is obtained from the plant[7]. It is used rather sparingly, in view of the difficulty in obtaining it, in perfumes that have a rather sharp tang[7]. The flowers close when wet weather is likely to occur and they can therefore be used as a rough means of weather forecasting[7].

dwatta Antiphlogistic Antiseptic Antispasmodic Aperient Astringent Cholagogue Diaphoretic Emmenagogue Homeopathy Skin Stimulant Vulnerary WartsPot marigold is one of the best known and versatile herbs in Western herbal medicine and is also a popular domestic remedy[4, 254]. It is, above all, a remedy for skin problems and is applied externally to bites and stings, sprains, wounds, sore eyes, varicose veins etc[4, 254]. It is also a cleansing and detoxifying herb and is taken internally in treating fevers and chronic infections[4, 254]. Only the common deep-orange flowered variety is considered to be of medicinal value[4]. The whole plant, but especially the flowers and the leaves, is antiphlogistic, antiseptic, antispasmodic, aperient, astringent, cholagogue, diaphoretic, emmenagogue, skin, stimulant and vulnerary[4, 7, 9, 21, 46, 165, 201]. The leaves can be used fresh or dried, they are best harvested in the morning of a fine sunny day just after the dew has dried from them[4]. The flowers are also used fresh or dried, for drying they are harvested when fully open and need to be dried quickly in the shade[4]. A tea of the petals tones up the circulation and, taken regularly, can ease varicose veins[201]. An application of the crushed stems to corns and warts will soon render them easily removable[7]. The leaves, blossoms and buds are used to make a homeopathic remedy[232]. It is used internally in order to speed the healing of wounds[232]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Calendula officinalis* for inflammation of the mouth and pharynx (throat), wounds and burns(see [302] for critics of commission E).

nrakta S. Europe. A garden escape in Britain[17]. ksacta The original habitat is obscure but it is found as a garden escape on waste, cultivated and arable land and along roadsides[200].

propta Seed - sow in situ from spring to early summer and again in September. The seed germinates best in darkness and usually within 1 - 2 weeks at 21°C[138]. The plant often self-sows freely.

nwatta Landscape Uses: Border, Container, Massing, Rock garden. An easily grown plant, it succeeds in any well-drained soil[200, 268], though it prefers a good loam and requires a sunny or at least partially sunny position[4, 15, 200, 268]. Plants flower best when they are grown in a poor soil[108]. Tolerates a pH in the range 4.5 to 8.3. The pot marigold is a very ornamental plant that is commonly grown in the flower garden, and occasionally as a culinary herb, there are some named varieties[183]. When well-sited it usually self-sows freely and will maintain itself if allowed[1, 4]. The flowers are sensitive to variations in temperature and dampness, closing when it is dark and when rain is expected[7, 244]. All parts of the plant are pungently scented[245]. The growing plant attracts hoverflies to the garden, the young of which are fairly efficient eaters of aphids[24, 201]. The flowers are attractive to bees[108]. Marigolds are good companion plants, they grow well with tomatoes[14]. Cucumber mosaic disease and powdery mildew can cause problems with this plant[188]. Special Features: Edible, Not North American native, Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers, Extended bloom season in Zones 9A and above. 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].

3.2.27 *Oxyria digyna*

Mountain Sorrel, Alpine mountainsorrel
2 tlin 8 cyuc 3 kcaak 0 tcan 1 dwat 0.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Oxyria digyna* 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 2 and is not frost tender. It is in flower

from June to August, 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 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 leaves contain oxalic acid, which gives them their sharp flavour. Perfectly all right in small quantities, the leaves should not be eaten in large amounts since oxalic acid can bind up the body's supply of calcium leading to nutritional deficiency. The quantity of oxalic acid will be reduced if the leaves are 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, 46, 62, 85, 257]. A pleasing acid taste[183] and an excellent potherb[1]. A very nice addition to salads[K]. The leaves can be fermented into a sauerkraut for winter use[183]. Use in moderation, see notes at top of sheet,

dwatta Antiscorbatic Astringent Dysentery Vitamin C The leaves are rich in vitamin C and are used to treat scurvy[212]. The roots, stems and leaves are cooked and eaten in the treatment of dysentery[272].

nrakta Mountains of the northern temperate zone, including Britain. ksacta Damp rocky places on mountains, especially by streams, avoiding acid soils[17]. Locally common on enriched soils below bird roosts[200].

propta Seed - sow spring in a cold frame and only just cover the seed. The seed germinates within 2 weeks. It can also be sown as soon as it is ripe, when it germinates within a few days. Prick the seedlings out into individual pots as soon as they are ripe and plant them out into their permanent positions in early summer. Division in the spring. 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 Prefers a moist well-drained rocky soil in a sunny position or partial shade[200]. Requires a lime free soil[200]. There is some controversy here since the plant is said to avoid acid soils in the wild[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 rhizomatous with underground stems sending roots and shoots along their length [1-2].

3.2.28 *Vaccinium angustifolium*

Low Sweet Blueberry, Lowbush blueberry
2 tlin 8 cyuc 3 kcaak 0 tcan 1 dwat 0.2 m hkuc
hmimhtut cyutli kyucput hwicli hrasjlut hpa7tli frusflat
hpa7tmwatli xre7t hjonli

drutta *Vaccinium angustifolium* is a deciduous Shrub growing to 0.2 m (0ft 8in). 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 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 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: Tea Fruit - raw, cooked or used in preserves etc[2, 161, 177, 183]. A very sweet pleasant flavour with a slight taste of honey[11, 43, 183]. Largely grown for the canning industry, it is considered to be the best of the lowbush type blueberries[183]. The fruit can be dried and used like raisins[62]. The fruit is about 12mm in diameter[200]. This is the earliest commercially grown blueberry to ripen[235]. A tea is made from the leaves and dried fruits[101].

dwatta Blood tonic Oxytoxic A tea made from the leaves has been used as a blood purifier and in the treatment of infant's colic[222, 257]. It has also been used to induce labour and as a tonic after a miscarriage[222, 257].

nrakta North-eastern N. America - Newfoundland to

Maryland, west to Iowa and Minnesota. ksacta Dry open barrens, peats and rocks[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 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].

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]. A very hardy plant, tolerating temperatures down to about -40°C[200]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. Cultivated for its ed-

ible fruits, there are some named varieties[1, 183]. It succeeds in cold northerly locations such as Maine in N. America[183] and in C. Sweden. However, it is said to have little or no value as a fruit crop in Britain[11]. The typical species is not as well known as its subspecies *V. angustifolium laevifolium*. House[11]. 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. 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 stoloniferous rooting from creeping stems above the ground [1-2].

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