

Plants For a Future 2021CE

Hardiness Zone 3, Acidic, Sandy Soil, Edibility 2/5+

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1 Introduction

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

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

Instructions for food forest design are in separate books. But basic idea is to have thorny plants on the border as a form of fence to keep out predators and animals that want to raid your food forest, with the shortest plants closest to the border, then gradually getting taller plants as you go in. For example starting with thorny herbaceous, 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, kcak /kʃak/ food (rating), tcan /tʃan/ other (uses rating), dwat /dʷat/ medicinal (rating), hkuc /hku/ (adult) height, hsi2n /hsi.ln/ (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 /hɡat/ drought (tolerant), kyuc /kju/ dry, tcup /tʃup/ damp, hja7n /hʒa7n/ 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 /hpa7t/ 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 /hpa7tmwat/ topsoil taste.

fyif /fjif/ self (fertile), xre7t /xre7t/, nyanhjen /njanhʒen/ male-female (dioecious, distinct male and female plants), hjon /hʒon/ 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.ln/ nitrogen-fixing, xlutkfam /xlut.kfam/ plant quantity, bwon /bwon/ bean, mran /mran/ corn/grain non-nitrogen-fixing plant, nrak /nrak/ continent (of origin), ksac /ksa/ circumstances/habitat.

3 hmuctrotkce, tcup hmuchwic, 2 kskankcak, hras hmuchpa7t, flat hmuchpa7tmwat, 310 xlutkxfam.

2 1 tlin

2.0.1 Pinus cembra sibirica

Siberian Pine

1 tlin 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 hardiness. It is hardy to UK zone 1. It is in leaf all year, in flower from May to June, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

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

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

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

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

propta It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed[80]. Plant seedlings out into their permanent positions as soon as possible and protect them for their first winter or two[11]. Plants have a very sparse root system and the sooner they are planted into their permanent positions the better they will grow[K]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm[200]. We actually plant them out when they are about 5 - 10cm tall. So long

as they are given a very good weed-excluding mulch they establish very well[K]. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Cuttings. This method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

nwatta Management: Standard Minor Global Crop Staple Crop: Protein-oilThrives 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 tlin 7 cyuc 3 kcaak 0 tcan 2 dwat 15 m hkcuc htut cyutli hgatykyuctuphja7n 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 hardiness. 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].

kcakta Edible Parts: Inner bark Sap SeedEdible Uses: Condiment GumInner 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 WoodA 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

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 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 - 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 Poultrice 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[229]. 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.

2.0.3 Geum triflorum

Purple Avens, Old man's whiskers, Prairie Smoke

1 tin 5 cyuc 2 kcaak 2 tcant 2 dwat 0.3 m hkuc hmimhtut cyutlii tcup hwicli hrasljutnyik hpa7tli flatprikwli hpa7tmwatli xre7t hjonli

drutta *Geum triflorum* is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 1. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcaakta Edible Parts: Edible Uses: TeaA decoction of the roots is a tea substitute[183, 257]. It tastes like a weak saffron tea[212]. A brew was used in Indian sweat houses as a body wash for aches and pains[207].

tcanta EssentialThe crushed ripe seeds are used as a perfume[207, 257].

dwatta Ophthalmic Salve TonicA strong decoction of the roots is used as a tonic in the treatment of severe coughs and fevers[207, 257]. This decoction can also be used as an eye wash and as a mouth wash for sore throats[213, 257]. An infusion of the roots, mixed with oil, can be applied as a salve to sores, rashes, blisters and flesh wounds[257]. An infusion can also be used as a wash for aching joints, stiff sore muscles etc[257].

nrakta N. America - Newfoundland and New York, west to British Columbia and south to California. ksacta Damp places and mountain springs[187].

propta Seed - sow spring or autumn in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. Division in spring or autumn. This should be done every 3 - 4 years in order to maintain the vigour of the plant[200]. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Landscape Uses:Ground cover. Easily grown in any moderately good garden soil that is well-drained[1]. Prefers a soil rich in organic matter[200]. Prefers a rather damp soil[187]. Plants are hardy to about -20°C[187]. Hybridizes freely with other members of this genus[200]. Special Features:Attractive foliage, North American native, Suitable for cut flowers.

2.0.4 Equisetum scirpoides

Dwarf scouring rush

1 tin 9 cyuc 2 kcaak 3 tcant 2 dwat 0.2 m hkuc pcmhmmhtut cyutlii tcuphja7n hwicli hrasljutnyik hpa7tli flatprikwli hpa7tmwatli hjonli

drutta *Equisetum scirpoides* is an evergreen Perennial growing to 0.2 m (0ft 8in) by 0.2 m (0ft 8in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 2. Suitable for: light (sandy), medium (loamy) and heavy (clay)

soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist or wet soil.

kcakta Edible Parts: Root Stem**Edible Uses:** The root tubercles can be eaten raw. Sterile stems are dried, ground to a powder and used for thickening or to make a mush. This powder has also been used to make a tea, and is sold in some grocery stores. Underground stems and roots are eaten raw, with or without lard, and are sometimes put in Indian ice-cream. Underground stems and roots are food to some native American groups. They are collected in the spring by water, and are sweet and juicy then, much relished as the first fruit of the season (flora.dempstercountry.org).

tcanta Groundcover: A medium density moderately good groundcover. The coarse green stems are used to scrub pots and clean dishes. Larger horsetails have the ability to absorb heavy metals from soil and are often used in remediation projects involving heavy metal contaminants. **Wildlife Benefits:** Amphibians, Cover, Fish, Food, Nesting, Waterfowl. **Containers.** Dynamic Accumulator.

dwatta We found no specific reference to this species but in general horsetails have an unusual chemistry compared to most other plants; they are rich in silica, more than 35%, contain several alkaloids (including nicotine) and various minerals. Horsetail is very astringent and makes an excellent clotting agent, staunching wounds, stopping nosebleeds and reducing the coughing up of blood. It helps speed the repair of damaged connective tissue, improving its strength and elasticity. Horsetail provides a naturally occurring source of organic silica. It is therefore a remedy for conditions where there is an inability to absorb and retain silica. When this occurs there are weaknesses in the hard structures of the body. The hair becomes thin, fails to thrive, and fizzes away into split ends. The nails are often weak, breaking easily, with hangnails and lingering infections about the nail. In homeopathy, silica is known as the "homeopathic scalpel," because of its ability to act like a blade, like flint, to cut, to bring matters to the surface and to heal charitably. It cuts in, opens tissues, and releases pus and corrupted material, while cleansing and reincarnating flesh. It has a centripetal effect, removing heavy, unneeded materials to the surface and out.

nrakta Native to northern Eurasia and America. **ksacta** Tundra, mossy places, and woods. Stems often partly buried in humus. Part shade, shade; moist woods, peat bogs, shady, mossy wetlands.

propta Rhizome sections. Horsetail plants produce the best rhizomes for propagation in the spring. Lengths of these underground stems, typically about 6 inches, with healthy shoots emerging from their joints produce the healthiest new plants.

nwatta A Long-lived perennial evergreen with fibrous roots and the smallest living horsetail. Can be used as an aquatic fern. Light requirement: Sun , Part Shade , Shade. Soil moisture: moist or wet (recommended water depth over crown of plant: 0 - 3cm (0 - 1 inch)). Water quality: pH 5.6-6.5. Useful for winter interest in a small pond, barrel, or tub garden, especially in shady areas. **Pond Zone:** flood plain - Upland. High marsh - saturated. soil spores shed from July through August, or persisting unopened until the following summer. 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]. Evergreen. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. Not a flowering plant. Reproduces by spores contained within sporangia borne on peltate sporophylls.

3 2 tlin

3.1 bwon

3.1.1 Caragana arborescens

Siberian Pea Tree, Siberian peashrub
tfo2n 2 tlin 7 cyuc 5 keak 4 tcan 1 dwat 6 m hkuc

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

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

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

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

nwatta Agroforestry Services: Living fence Agroforestry Services: Nitrogen Agroforestry Services: Wind-break Industrial Crop: Biomass Management: Coppice Management: Standard Minor Global Crop Staple Crop: Protein Succeeds in most well-drained soils, preferring full sun and a light sandy dry or well-drained soil[1, 11, 200]. Tolerates very alkaline soils[202]. Plants do not require a rich soil[1, 11, 108], succeeding on marginal land[160]. Established plants are drought resistant[160]. Fast growing[188]. Dormant plants are hardy to about -30°C[184], they prefer a continental climate and do not grow so well in areas that do not have very cold winters[200]. They grow and fruit very well in the eastern half of the country, even in northern areas, though they do not do so well in the wetter west[K]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. The Siberian pea shrub has an excellent potential to become a staple food crop. The seed is nutritious and wholesome, although rather small it is often very freely borne and is easily

harvested[K]. This species has also been recommended as a nitrogen-fixing windbreak and ground cover plant that binds the soil and produces fibre and dye stuffs[218]. *C. boissii* and *C. fruticosa* are closely related to this species[182] and can probably be used similarly[K]. A very ornamental plant, some named forms have been developed for their ornamental value[182]. 'Nana' is a very compact dwarf form[183] that grows slowly[11]. 'Pendula' has stiffly pendent branches but is otherwise the same as the type species[11]. A good bee plant[74]. Plants in this genus are notably resistant to honey fungus[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2].

3.1.2 *Elaeagnus angustifolia*

Oleaster, Russian olive
tfo2n 2 tlin 7 cyuc 4 kcaak 4 tcan 2 dwat 7 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjltunyk hpa7tli flatprik-lwissliphom hpa7tmwatli xre7t hjonli

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

kcakta Edible Parts: Fruit Seed Edible Uses: Gum Fruit - raw or cooked as a seasoning in soups[1, 2, 3, 100, 146, 174]. Dried, sweet and mealy[11, 145, 183]. The fruit can also be made into jellies or sherbets[183]. The fruit must be fully ripe before it can be enjoyed raw, if even slightly under-ripe it will be quite astringent[K]. The oval fruit is about 10mm long[200] and contains a single large seed[K]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous[K].

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

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

of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta Europe to W. Asia, extending as far north as latitude 55° in Russia. ksakta 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 Crop Landscape 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 hgatkuyctcup hwicli hyishrasjltunyk hpa7tli flatprik-lwissliphom 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. 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].

Edible Parts: Oil Seed Seedpod
Uses: 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].

Dye: 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].

Asia - China: *ksacta* Not known
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.

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

fto2n 2tlin 6 cyuc 3 kcaak 4 tcan 2 dwat 3 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjlutnyik hpa7tli flat-
prikwslwslip hpa7tmwatli xre7t hjonli

druetta *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.

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].

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].

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].

North America - Quebec to Alaska and south to Utah, S. Dakota and Minnesota: *ksacta* Dry calcareous slopes[43, 184].

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.

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

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*

Northen Bayberry
tfo2n 2 tlin 9 cyuc 3 kcaak 3 tcan 1 dwat 3 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyik 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].

kcaakta Edible Parts: FruitEdible Uses: CondimentFruit - 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 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 wind 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.

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 hardier 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 kcaak 3 tcan 2 dwat 2.5 m hkuc
hmimhtut cyutli hgatkyuctcup hwicli hyishrasjlutnyik hpa7tli
flatprikhwis 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].

kcaakta Edible Parts: FruitEdible 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

being it becoming foamy[256]. The foam would then be flavoured with a sweet food such as cooked quamash 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].

dwata 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 multitemped 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].

3.1.7 *Myrica gale*

Bog Myrtle, Sweetgale

tfo2n 2 tlin 9 cyuc 2 kcaak 4 tcan 2 dwat 2 m hkuc hmimhtut cyutli tcuphja7n hwicli hrasjlutnyik hpa7tli frus-flatprikliwis hpa7tmwatli nyanhjen hjonli

drutta *Myrica gale* is a deciduous Shrub growing to 2 m (6ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 1. It is in flower from March to May, and the seeds ripen from August to September. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Wind. The plant is not self-fertile. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil.

pcista This plant is an abortifacient and so should not be eaten by pregnant women[4, 172].

ksakta Edible Parts: Fruit **Edible Uses:** Condiment Tea The aromatic fruits and leaves are used either fresh or dried to flavour soups, stews etc[2, 4, 62, 100, 183]. They are sometimes put in beer and ale to improve the flavour and increase foaming[183]. The fruit is about 3mm in diameter with a single large seed[200]. The dried leaves make a delicate and palatable tea[4, 62, 172, 183].

tcanta Dye Essential Parasiticide Repellent Tannin Wax A wax covering on the fruit and leaves 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[4, 6, 245]. These candles diffuse a delightful odour when burnt[245]. Unfortunately this species does not produce enough wax to make it commercially viable[115]. A yellow dye is obtained from the stem tips[66, 115, 172]. Brown according to another report[257]. A yellow dye is obtained from the seeds[257]. The bark contains tannin and can be gathered in the autumn and used as a yellow dye[4]. The plant repels moths and insects in general[66, 106, 115]. The fragrant leaves are used[4, 100]. A strong decoction of the leaves can be used as a parasiticide to kill external body parasites[172]. A fragrant essential oil is obtained from the fruits[115]. **Nitrogen Fixer.**

dwatta Abortifacient Antipruritic Aromatic Astringent Emmenagogue Parasiticide Stomachic The leaves are abortifacient, aromatic, astringent, emmenagogue and stomachic[4, 46, 172, 238]. The leaves are normally used as a tea, but they do contain a poisonous aromatic oil, so some caution is advised in their use[4].

nrakta Western Europe, including Britain, from Scandinavia to Portugal, east to N.W. Russia. N. America. **ksacta** Bogs, marshes, fens and wet heathland in acid soils but plants are occasionally found in calcareous fens[5, 17, 186].

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 There is some difference of opinion about the needs of this plant. Most reports say that it prefers a moist soil and that it grows well in an open position in a well-drained soil in sun or light shade. Most reports also say that it prefers or even requires a lime-free loamy or peaty soil[1,

but another report says that it succeeds in any ordinary garden soil[11]. In the wild it is usually found in soils with a pH between 3.5 and 6, but it is also sometimes found in fens with a pH as high as 7.5[186]. A suckering shrub, when well sited it can form thickets[186]. This species has 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]. This habit also allows the plant to succeed in water-logged soils[186]. Dioecious. Male and female plants must be grown if seed is required. This plant is occasionally monoecious and also can change sex from year to year[50]. Flowers are produced mainly on one-year old wood[4]. All parts of the plant are pleasantly aromatic[186]. A good food plant for the caterpillars of many species of butterflies[30]. Plants in this genus are notably resistant to honey fungus[200]. The plant is heat tolerant in zones 6 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

3.1.8 *Amorpha canescens*

Lead Plant
tfo2n 2 tlin 9 cyuc 2 kcak 3 tcan 2 dwat 1.2 m hkuc
hmmihmt cyutli hgatkuyctcup hwicli hyishrasjlut hpa7tli flat-
prikliwis hpa7tmwatli xre7t hjonli

drutta *Amorpha canescens* is a deciduous Shrub growing to 1.2 m (4ft) by 1.5 m (5ft in). See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from July to September. The species is hermaphrodite (has both male and female organs). It can fix Nitrogen. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: OilEdible Uses: Oil TeaAn infusion of the dried leaves makes a pleasant tasting yellow-coloured tea[161, 177, 183, 257].

tcanta Insecticide Miscellany Oil Repellent Shelterbelt Soil stabilizationPlants have an extensive root system, they tolerate poor dry soils and are also wind resistant, they are used as a windbreak and also to prevent soil erosion[200]. Resinous pustules on the plant contain 'amorpha', a contact and stomachic insecticide that also acts as an insect repellent[57, 200].

dwata Anthelmintic Eczema Miscellany Salve Skin StomachicAn infusion of the leaves has been used to kill pinworms or any intestinal worms[257]. The infusion is also used to treat eczema, the report does not say it if is used internally or externally[257]. The dried and powdered leaves are applied as a salve to cuts and open wounds[257]. A decoction of the root is used to treat stomach pains[257]. A moxa of the twigs has been used in the treatment of neuralgia and rheumatism[257].

nrakta Eastern N. America - Indiana to Minnesota and Manitoba, south to Kansas and New Mexico. ksacta Dry sandy prairies, hills and woodland[43, 200].

propta Seed - presoak for 12 hours in warm water and sow early spring in a greenhouse[78, 133]. The seed usually germinates in 1 - 2 months at 20°C[133]. When large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, June/July in a

frame. High percentage[78]. Cuttings of mature wood of the current seasons growth, autumn, in a sheltered position outdoors. Takes 12 months[78]. Suckers in spring just before new growth begins[200]. Layering in spring .

nwatta Prefers a light well-drained sandy soil in sun or light shade[1, 200]. Tolerant of poor dry soils, plants can be invasive in rich soils[200]. Wind resistant[200]. A very hardy plant, tolerating temperatures down to about -25c[184, 200] but it frequently dies down to ground level in the winter, resprouting from the base in the following spring[182]. A very ornamental plant[1]. A deep rooted plant, it thrives best in hot, droughty seasons[11]. It only ripens its seed in fine autumns[11]. Immune to insect pests, the plant contains its own insecticide[200]. At one time this plant was supposed to indicate the presence of lead in the soil[182]. There is some confusion over the correct author of the Latin name of this plant. It is probably Pursh. as stated on the top of this sheet, but some books cite Nutt. 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]. The root pattern is a tap root similar to a carrot going directly down [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

3.2 *mran*

3.2.1 *Rubus arcticus*

Arctic Bramble, Arctic raspberry, Dwarf raspberry
2 tlin 7 cyuc 5 kcak 1 tcan 0 dwat 0.2 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikliwis
hpa7tmwatli xre7t hjonli

drutta *Rubus arcticus* is a PERENNIAL growing to 0.2 m (0ft 8in) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 1. It is in flower from June to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It cannot grow in the shade. It prefers moist soil.

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

growing 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..

3.2.2 Cucurbita maxima

Winter Squash

2 tlin 11 cyuc 5 kcak 2 tcan 3 dwat m hkuc
hmmhtmut 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 Poulitice 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 tonic[240]. The fruit pulp is used as a soothing poultice on burns, inflammations and boils[240].

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

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

nwatta Requires a rich, well-drained moisture retentive soil and a very warm, sunny and sheltered position[37, 86]. Prefers a pH of 5.5 to 5.9, but tolerates up to 6.8[86]. Dry periods with a relatively low humidity favour the best growth[200]. A frost-tender annual plant, it is widely cultivated in tropical and temperate zones for its edible fruit,

there are many very 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].

3.2.3 Brassica oleracea italica

Broccoli

2 tlin 11 cyuc 5 kcak 2 tcan 0 dwat 0.9 m hkuc
hmmhtmut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli fyifxre7t hjonli

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

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

tcanta Companion 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].

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].

3.2.4 Cucurbita moschata

Squash, Crookneck squash

2 tlin 11 cyuc 5 kca1 1 tcan 3 dwat m hkuc
 hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprik
 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 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[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].

3.2.5 Zea mays

Sweet Corn, Corn

2 tlin 11 cyuc 5 kca3 3 tcan 3 dwat m hkuc
 htut cyutli tcup hwicli hrasljutnyik hpa7tli flatprik
 hpa7tmwatli hjonli

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

kcakta Edible Parts: Oil Oil Pollen Seed 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

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].

3.2.6 Viburnum lentago

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

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

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

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

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

been drunk, or a poultice of leaves applied, in the treatment of dysuria[257].

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

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

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

3.2.7 Smilacina racemosa

False Spikenard
2 tlin 8 cyuc 4 kcak 2 tcan 2 dwat 1 m hkuc
pcimhmim cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli fyfjxre7t hjonli

drutta Smilacina racemosa is a PERENNIAL growing to 1 m (3ft 3in) by 0.6 m (2ft). See above for USDA hardness. 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

not used to eating this fruit[85, 102, 159, 183]. Thorough cooking removes much of this laxative element[183]. Young leaves - raw or cooked[102]. The young shoots, as they emerge in spring, can be cooked and used as an asparagus substitute[55, 85, 102, 159, 183]. Root - cooked[85]. It should be soaked in alkaline water first to get rid of a disagreeable taste[85, 102, 159, 183]. It can be eaten like potatoes or pickled[183].

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

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

nrakta N. America - British Columbia to Nova Scotia, south to Georgia and Missouri. ksacta Moist coniferous and deciduous woods, clearings and bluffs[43, 60, 187], preferring shaded stream-sides[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 wat 1.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlitutnyik hpa7tli frusflatprikli-wissliphsom hpa7tmwatli nyanhjen hjonli

duttra *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: Coffee Young 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

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 kcaak 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. ksakta Swamps, low wet woods, pine barrens and dry uplands[43].

propta Seed - sow late winter in a greenhouse in a lime-free potting mix and only just cover the seed[78]. Stored seed might require a period of up to 3 months cold stratification[113]. Another report says that it is best to sow the seed in a greenhouse as soon as it is ripe[200]. Once they are about 5cm tall, prick the seedlings out into individual pots and grow them on in a lightly shaded position in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of 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 *Rubus chamaemorus*

Cloudberry

2 tlin 4 cyuc 4 kcaak 2 tcan 1 dwat 0.3 m hkuc
htut cyutli tcuphja7n hwicli hrasjlutnyik hpa7tli frusflatprik
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. ksakta 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].

3.2.11 *Coriandrum sativum*

Coriander - Dhania - Cilantro, Coriander

2 tlin 11 cyuc 4 kcaak 4 tcan 4 dwat 0.5 m hkuc

ummm[1]. Autumn sown plants will grow bigger and produce more seed.

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

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

dwatta 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]. ksakta Waste places and arable land, often by the sides of rivers[4, 9].

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

umn[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].

3.2.12 Cornus canadensis

Creeping Dogwood, Bunchberry dogwood, Bunchberry
2 tin 7 cyuc 4 kcak 2 tcan 2 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrilp hpa7ti 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. ksakta 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

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

3.2.13 Anethum graveolens

Dill
2 tlin 11 cyuc 4 kcak 2 tcan 3 dwat 0.8 m hkuc
htut cyutli tcup hwicli hrasjlut hpa7tli flatprikhwis
hpa7tmwatli fyifxre7t hjonli

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

pcista Dill is said to contain the alleged '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 the 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 phytoesterol and no cholesterol), 55.2g carbohydrate, 21g fibre, 6.7g ash, 1,516mg calcium, 277mg phosphorus, 16.3mg iron, 256mg magnesium, 20mg sodium, 1,186mg potassium, 5.2mg zinc, 53IU vitamin A, 0.42mg thiamine and 0.28mg riboflavin[218]. An essential oil from the seed is used as a flavouring in the food industry[46, 105]. A tea is made from the leaves and/or the seeds[183].

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

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

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

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

nwatta Landscape Uses:Border, Container. An easily grown plant[4], it prefers a moderately rich loose soil and full sun[14, 27, 88]. Requires a well-drained soil[27] and shelter from the wind[200]. Tolerates a pH in the range 5.3 to 7.8. Dill is a commonly cultivated herb, especially in warm temperate and tropical zones. It is grown mainly for its edible leaves and seeds, though it is also used medicinally. There are many named varieties[142, 183]. 'Bouquet' is an American cultivar that has a prolific production of seeds[238]. The sub-species A. graveolens sowa from India has a slightly different flavour to the type species[238]. The plant quickly runs to seed in dry weather[200]. It often self-sows when growing in a suitable position[37, 88]. A good companion for corn and cabbages, also in moderation for cucumbers, lettuce and onions, but it inhibits the growth of carrots[14, 18, 20]. Dill reduces a carrot crop if it is grown to maturity near them[201]. However, the young plant will help to deter carrot root fly[201]. The flowers are very attractive to bees[14, 18, 20]. **Special Features:**Attractive foliage, Edible, Fragrant foliage, Not North American native, Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers.

3.2.14 Cucurbita argyrosperma

Cushaw Pumpkin

2 tlin 11 cyuc 4 kcak 1 tcan 2 dwat 0.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis
hpa7tmwatli fyif hjonli

drutta Cucurbita argyrosperma is a ANNUAL CLIMBER growing to 0.5 m (1ft 8in) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 3 and is frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found

on the same plant) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Flowers Fruit Leaves Oil Seed Edible Uses: Oil Fruit - 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 Oil The seed is rich in oil.

dwatta Vermifuge The 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].

3.2.15 *Cucurbita pepo*

Pumpkin, Field pumpkin, Ozark melon, Texas gourd
2 tlin 11 cyuc 4 kcak 2 tcan 3 dwat 0.6 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
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 Poultrice Urinary The pumpkin has been much used as a medicine in Central and North America. It is a gentle and safe remedy for a number of complaints, especially as an effective tapeworm remover for children and pregnant women for whom stronger acting and toxic remedies are unsuitable[254]. The seeds are mildly diuretic and vermifuge[7, 88, 254]. The complete seed, together with the husk, is used to remove tapeworms. The seed is ground into a fine flour, then made into an emulsion with water and eaten. It is then necessary to take a purgative afterwards in order to expel the tapeworms or other parasites from the body[7]. As a remedy for internal parasites, the seeds are less potent than the root of *Dryopteris felix-mas*, but they are safer for pregnant women, debilitated patients and children[238]. The seed is used to treat hypertrophy of the prostate[218]. The seed is high in zinc and has been used successfully in the early stages of prostate problems[254]. The diuretic action has been used in the treatment of nephritis and other problems of the urinary system[254]. The leaves are applied externally to burns[240]. The sap of the plant and the pulp of the fruit can also be used[254]. The fruit pulp is used as a decoction to relieve intestinal inflammation[254].

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

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

nwatta Requires a rich, well-drained moisture retentive soil and a very warm, sunny and sheltered position[1, 16, 37, 86]. Prefers a pH of 5.5 to 5.9, but tolerates up to 6.8[86]. Plants are tolerant of light shade[86] (This comment is probably more applicable to warmer climates than Britain[K]). A frost-tender annual plant, the pumpkin or marrow is widely cultivated in temperate and tropical zones for its edible fruit. It has long been grown as a domestic plant and a number of different groups have been developed. Botanists have tried to classify these groups, though there is considerable overlap and clear distinctions are not always possible. Since they are very similar in their cultivation needs, we have treated all the groups together in this entry. The botanists classification is as follows:- *C. pepo pepo*. This includes the vegetable marrows, zucchinis, pumpkins and ornamental gourds. There are many named varieties and these can vary considerably in size, shape and flavour[27, 183, 200]. The cultivars with larger and rounder fruits are usually called pumpkins, the fruits are harvested in the autumn and can be stored for a

few months. The marrows are smaller than pumpkins and generally sausage-shaped. These can also be harvested in the autumn and stored for a few months, but it is more usual to eat them whilst they are still very small, when they are known as courgettes. Harvesting the fruits of the marrows when very small stimulates the plant into making more flowers (and hence fruits) so it can be a very productive way of using the plant. Pumpkins and marrows succeed outdoors most summers in Britain[27], in fact many of these varieties are well adapted to cool growing conditions and therefore do well in the British climate[200]. *C. pepo pepo fraterna*. This is the probable progenitor of the marrows and so is of potential value in any breeding programmes. *C. pepo ovifera*. This group includes various summer squashes including the acorn, crookneck and patty pan squashes. *C. pepo ovifera ozarkana*. A probable ancestor of the summer squashes, it could be of value in breeding programmes. *C. pepo texana*. The Texas gourd, or wild marrow, is another form that could be of value in breeding programmes. Plants produce both male and female flowers. These are insect pollinated but in cool weather it is worthwhile hand pollinating[200]. Most cultivars are day-length neutral and so are able to flower and fruit throughout the British summer[200]. A fast-growing plant, trailing forms can be used to provide a summer screen[86]. This species does not hybridize naturally with other edible members of this genus[135]. Squashes and pumpkins can be differentiated from each other by their fruit stalk, it is angular and polygonal in pumpkins but thick, soft and round in squashes[132]. Pumpkins grow well with sweetcorn and thornapple but they dislike growing near potatoes[18, 20, 201]. They also grow well with nasturtiums, mint, beans and radishes[201].

3.2.16 *Populus hybrids*

Hybrid poplar

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

hmmihtut 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.

kcakta Edible Parts: Inner bark Leaves SeedEdible

Uses: TeaLeaves 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 TonicSome. 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].

nraکتa 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: ProteinClimate: 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 kcak 5 tcan 3 dwat 25 m hkuc

htut cyutli tcuphja7n 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.

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

tcanta Basketry Biomass Fencing Filter Fodder Soil stabilization Weaving WoodWastewater 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.

nraکتa 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 Fodder 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: Coppice Minor Global Crop Other Systems: SRCClimate: ,

optimal 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 the 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 lin 6 cyuc 3 kcaok 5 tcan 3 dwat 20 m hukc
htut cyutli kyuctup hwicli hyshtasjratnutnyikfrup hpa7tli frusflatpriklwis hpa7tmwattli 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 WoodThe 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]. An-

other 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, besoms etc[6]. They are also used in thatching[13, 100] 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 Lithotropic Miscellany Skin UrinaryAnti-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 ckaak 5 tcan 3 dwat 20 m hkkuc
htut cyatli kyuctcuphja7n hwicli hycishrasjlutnykfrip hpa7tli
fruslatprkrikwis hpa7tmwattli 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 hardness. 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]

kcakta Edible Parts: Flowers Inner bark Leaves Sap Edible Uses: Tea Inner 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, KJ]. 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 limon'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 Wood The 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 Lithotropic Miscellany Skin Urinary Anti-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 anticholesterolic and diuretic[7]. They also contain phytoestrogens, 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 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).

nrahta 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

not activity working to improve the soil[14]. Trees are not notably susceptible to honey fungus[200].

3.2.20 *Vitis riparia*

Riverbank Grape

2 tin 6 cyuc 3 kcaak 2 tcan 0 dwat 15 m hkuac
hmimhtut cyutli kyuctup hwicli hrasjlutnyik hpa7tli flat-
prikhlwis 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 (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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 phylloxera 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 Phylloxera 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 tin 7 cyuc 3 kcaak 0 tcan 1 dwat 3 m hkuac
hmimhtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flat-
prikhlwis hpa7tmwatli fyfixre7t hjonli

drutta *Viburnum trilobum* is a deciduous Shrub growing to 3 m (9ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 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 Vitaminc 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*

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

2 tlin 8 cyuc 3 kcaok 0 tcan 1 dwat 2.5 m hkuc
hmmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli dyatxre7t hjonli

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.

ksakta Edible Parts: FruitEdible Uses: TeaFruit - raw or cooked[3, 46, 62, 65, 101]. The scant flesh is sweet and well flavoured, hanging on the plant well into the winter[183]. The oval fruit is about 10mm long and contains a single large seed[235, K]. The leaves are used as a tea substitute[46, 61]. A pleasant taste[183]. The leaves are steamed over boiling water, rolled between the fingers, allowed to stand overnight and then dried in an oven to be used as required[183].

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. ksakta 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 kcaok 4 tcan 0 dwat 1.2 m hkuc
hmmimhtut cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprik
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.

ksakta 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 ksakta 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 kcaok 3 tcan 3 dwat 1 m hkuc
htut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flatprik
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: Flowers Edible Uses: Colouring Condiment The 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 saffron 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)

tcanta Companion Dye Insecticide Repellent Landscape Uses: 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 Stomachic The 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 *Calendula officinalis*

calendula, Pot Marigold

2 tlin 11 cyuc 3 kcaak 4 tcan 5 dwat 0.6 m hkuc hmimhtut cyutli tcup hwiylci hyishrasj lutnyik hpa7tli frusflat-prikwislip hpa7tmwatli hjonli

drutta *Calendula officinalis* is a 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].

kcakta Edible Parts: Flowers Leaves Edible Uses: Colouring Tea Leaves - 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 forecasting The 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,

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].

3.2.26 *Oxyria digyna*

Mountain Sorrel, Alpine mountainsorrel
2 tlin 8 cyuc 3 kcaak 0 tcan 1 dwat 0.5 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
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 Antiscorbutic 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].

3.2.27 *Vaccinium angustifolium*

Low Sweet Blueberry, Lowbush blueberry
2 tlin 6 cyuc 3 kcaak 0 tcan 1 dwat 0.2 m hkuc
hmmihtut cyutli kyuctcup 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 edible 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].

3.2.28 *Vaccinium angustifolium laevifolium*

Low Sweet Blueberry

2 tlin 6 cyuc 3 kcaok 0 tcan 0 dwat 0.6 m hkuc
hmmihtut cyutli kyucup hwicli hrsajlut 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.

kcakta Edible Parts: Fruit Edible Uses: Tea Fruit - 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].

3.2.29 *Larix occidentalis*

Western Larch

2 tlin 6 cyuc 2 kcaok 0 tcan 2 dwat 45 m hkuc
htut cyutli tcup hwicli hyhshrasjlut hpa7tli flatprikhlwis
hpa7tmwatli hjonli

drutta *Larix occidentalis* is a deciduous Tree growing to 45 m (147ft 8in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. 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. Suitable for: light (sandy) and medium (loamy) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It

prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Manna Sap Edible Uses: Gum Sweetener A gum, or resin, is produced under the bark. It is a gum arabic substitute, very soluble in water, and is used as a thickening agent, stabilizer, emulsifier and for chewing[183, 226]. It exudes from the trunk and branches but commercially it is usually obtained by extraction from wood chips as a by-product of the lumber industry[142, 161]. The sap can be harvested in the spring and, when concentrated by boiling off much of the water, is made into a sweet syrup[183, 257]. A source of an edible manna[183]. No further details are given, but this report probably refers to the gum mentioned above[K].

tcanta Cosmetic Fuel Gum Paint Tannin Wood A red powder can be made by heating the resin and then grinding. This powder was mixed with fat and used as a cosmetic, or mixed with balsam poplar buds (*Populus* spp.) and used as a paint[226, 257]. The bark contains tannin[229]. Wood - hard, strong, very heavy, very durable in the soil[82, 226]. The tree produces long straight knotless trunks and is a very important commercial crop in its native range[226]. It is used for posts, cabinet making, construction, plywood etc[46, 61, 171]. A very good fuel[60].

dwatta Antirheumatic Antiseptic Blood purifier Poultice Salve The gum obtained from under the bark is used as a dressing in the treatment of cuts and bruises[257]. An infusion of the bark has been used in the treatment of coughs, colds and tuberculosis[257]. A decoction has been used as a wash on wounds and sores[257]. The sap has been chewed in the treatment of a sore throat[257]. The leaves and stems are antirheumatic, antiseptic, appetizer and blood purifier[257]. A decoction has been used both internally and externally in the treatment of cancer, and is said to help an emaciated patient get better and gain weight[257]. A decoction of the stem tips has been taken internally and also used as a soak on arthritic limbs and as a wash for cuts and sores[257].

nrakta Western N. America - British Columbia to Montana, south to Washington and Oregon. ksacta Mountain valleys and lower slopes, often in swampy areas, usually in mixed stands[60].

propta Seed - sow late winter in pots in a cold frame. One month cold stratification helps germination[113]. It is best to give the seedlings light shade for the first year[78]. As soon as they are large enough to handle, prick out the seedlings into individual pots. Although only a few centimetres tall, they can be planted out into their permanent positions in the summer providing you give them an effective weed-excluding mulch and preferably some winter protection for their first year. Otherwise grow them on in the cold frame for their first winter and plant them out in early summer of the following year. The seed remains viable for 3 years[113] If you are growing larger quantities of plants, you can sow the seed in an outdoor seedbed in late winter. Grow on the seedlings in the seedbed for a couple of years until they are ready to go into their permanent positions then plant them out during the winter.

nwatta Industrial Crop: Hydrocarbon Management: Standard Regional Timber Landscape Uses: Specimen. Prefers an open airy position in a light or gravelly well-drained soil[200]. Plants are intolerant of badly drained soils, but they tolerate acid and infertile soils[200]. Succeeds on rocky hill or mountain sides and slopes[200]. A north or east aspect is more suitable than west or south[1]. This is a very cold-hardy species when fully dormant, but on the whole the trees are a disappointment in Britain. They are often excited into premature growth in this country by periods of mild weather in the winter and are then subject to damage by late frosts and cold winds. They also often suffer from canker and die-back[185]. Good trees, however, can be very good and fast growing, often putting on new annual growth of 1 metre when young[185]. Older trees develop a very thick bark, which protects them from forest fires[226]. Hybridizes freely with other members of this genus[200]. Open ground plants, 1 year x 1 year are the best for planting out, do not use container grown plants with spiralled roots[200]. Plants transplant well, even when coming into growth in the spring[200]. Plants in this genus are notably resistant to honey fungus[200]. Special Features: North American native, Wetlands plant, Attractive flowers or blooms.

3.2.30 *Picea abies*

Norway Spruce

2 tlin 7 cyuc 2 kcaak 4 tcan 1 dwat 30 m hkuc
htut cyutli tcuphja7n hwicli hyishrasjltutnyik hpa7tli frusflat-
prik hpa7tmwatli hjonli

drutta *Picea abies* is an evergreen Tree growing to 30 m (98ft) by 10 m (32ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in leaf all year, in flower from May to June, and the seeds ripen from October 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 Wind. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It cannot grow in the shade. It prefers moist or wet soil. The plant can tolerate maritime exposure. It cannot tolerate atmospheric pollution.

kcakta Edible Parts: Flowers Inner bark Seed Edible Uses: Tea Young male catkins - raw or cooked. Used as a flavouring[172]. Immature female cones - cooked. The central portion, when roasted, is sweet and syrupy[172]. Inner bark - dried, ground into a powder and used as a thickener in soups etc or added to cereals when making bread[172]. An emergency food, used when all else fails. Seed - raw. Rich in oil and with a pleasant slightly resinous flavour, but too small and fiddly to be worthwhile unless you are desperate[172]. A refreshing tea, rich in vitamin C, can be made from the young shoot tips[172]. These tips are also used in making spruce beer[183].

tcanta Adhesive Essential Pitch Shelterbelt Tannin Varnish Wood The tree is a source of pitch (Burgundy pitch) and turpentine (Jura turpentine)[1, 7, 46, 64]. Burgundy pitch is used as a varnish and in medicinal plasters[57]. It is a strong adhesive[61, 64]. The turpentine is a waterproof and wood preservative. They are obtained by incisions in the trunk, the resin is scraped out some months later[64]. An essential oil from the leaves is used in perfumery[46, 61]. The seed contains 30% of a fatty oil, this is used in the production of a varnish[74]. The bark contains some tannin[171]. Both the bark and bark extract have been widely used in Europe as a source of tannin, the bark containing up to 13% tannin[223]. Yields of tannin have been doubled by heating or steaming the bark as soon as possible after the tree has been felled[223]. A fairly wind resistant tree and fast growing, it can be planted in shelterbelts to provide protection from the wind[200]. The dwarf cultivar 'Inversa' can be grown as a ground cover plant in a sunny position[188]. The cultivars 'Reflexa' and 'Procumbens' can also be used[208]. They are best spaced about 1 metre apart each way[208]. Wood - medium hard, fairly elastic, durable under water, light in weight and colour. Used for general carpentry, joinery, musical instruments etc. Valued for its use in the pulp industry to make paper[1, 11, 13, 46, 66].

dwatta Antibiotic Antiseptic Balsamic Expectorant Poul-
tice Sedative Vitamin C The buds, leaves and resin are antibi-
otic, antiseptic, balsamic, expectorant, sedative[7]. A pitch,
or resin, obtained from the trunk is rubefacient and stimu-
lant[240]. It is used externally in plasters etc for its healing
and antiseptic properties[7]. A poultice of the sap or gum has
been used in the treatment of boil and abscess pain[257].

nrakta N. and C. Europe. ksacta Not known

propta Seed - stratification will probably improve ger-
mination so sow fresh seed in the autumn in a cold frame if
possible[80]. Sow stored seed as early in the year as possi-
ble in a cold frame[78]. A position in light shade is probably
best[78]. Seed should not be allowed to dry out and should
be stored in a cool place[80]. Prick out the seedlings into in-
dividual pots when they are large enough to handle and grow
them on in the greenhouse or cold frame for their first win-
ter. They can be planted out into their permanent positions
in early summer of the following year, or be placed in an out-
door nursery bed for a year or so to increase in size. They
might need protection from spring frosts. Cuttings of semi-
ripe terminal shoots, 5 - 8cm long, August in a frame. Protect
from frost. Forms roots in the spring[78]. Cuttings of mature
terminal shoots, 5 - 10cm long, September/October in a cold
frame. Takes 12 months[78]. Cuttings of soft to semi-ripe
wood, early summer in a frame. Slow but sure.

nwatta Landscape Uses: Firewood, Screen, Specimen.
Likes abundant moisture at the roots, if grown in drier ar-

reas it must be given a deep moist soil[11]. Succeeds in
most soils including those that are wet cold and shallow,
but it is not very wind-firm in shallow soils[1]. Intolerant of
chalky or poor acid soils[11]. Tolerates poor peaty soils[200].
Prefers a pH between 4 to 6[200]. Dislikes shade[200] ac-
cording to one report whilst another says that it is moder-
ately shade tolerant[125]. Intolerant of atmospheric pollu-
tion[11]. Resists wind exposure to some degree and is toler-
ant of saline winds[200]. A very cold-hardy tree when fully
dormant, though the young shoots are subject to injury by
late frosts[1], though less so than *P. sitchensis*[125]. A fast
growing tree, it is widely planted in cool temperate zones for
its wood[200]. Young trees often grow 1 metre or more a year
and can sustain an average of 60cm for at least the first 60
years though growth tails off as they grow older[185]. Prob-
ably not that long-lived in Britain, about 200 years seems
the absolute maximum[185]. In some upland areas, espe-
cially over granitic or other base-poor soils, growth rate and
health have been seriously affected by aluminium poisoning
induced by 'acid rain' pollution[200]. There are many named
varieties, almost all of them dwarf forms[200]. A food plant
for many caterpillars[30]. A very aggressive tree, it is hostile
to other trees[18]. Susceptible to attacks by bark beetles so
it should be kept away from more valuable trees. A biolog-
ical control is being introduced (1983)[125]. This species is
susceptible to honey fungus[81]. Trees should be planted
into their permanent positions when they are quite small,
between 30 and 90cm. Larger trees will check badly and
hardly put on any growth for several years. This also badly
affects root development and wind resistance[200]. Plants
are strongly outbreeding, self-fertilized seed usually grows
poorly[200]. They hybridize freely with other members of
this genus[200]. The seed is shed in spring[1], the cones
release their seed whilst they are still on the tree[81]. The
bruised leaves emit a delicious musky smell[245]. Special
Features: Not North American native, Inconspicuous flow-
ers or blooms.

3.2.31 *Larix laricina*

Tamarack, Hackmatack, American Larch

2 tlin 5 cyuc 2 kcaak 0 tcan 2 dwat 18 m hkuc
htut cyutli tcuphja7n hwicli hyishrasjltut hpa7tli flatprikwis
hpa7tmwatli hjonli

drutta *Larix laricina* is a deciduous Tree growing to 18 m
(59ft 1in) at a medium rate. See above for USDA hardiness.
It is hardy to UK zone 2 and is not frost tender. It is in flower
from March to April, and the seeds ripen in October. The
species is monoecious (individual flowers are either male or
female, but both sexes can be found on the same plant) and
is pollinated by Wind. Suitable for: light (sandy) and medium
(loamy) soils, prefers well-drained soil and can grow in nutri-
tionally poor soil. Suitable pH: mildly acid, neutral and basic
(mildly alkaline) soils. It cannot grow in the shade. It prefers
moist or wet soil. The plant can tolerate strong winds but
not maritime exposure.

pcista Sawdust from the wood has been known to cause
dermatitis in some people[222].

kcakta Edible Parts: Leaves Edible Uses: Tea The young
shoots are used as an emergency food[177]. A tea is made
from the roots[161]. A tea is made from the branches and
needles[257].

tcanta Disinfectant Fibre Resin Tannin Wood Resin is ex-
tracted by tapping the trunk. It is obtained from near the
centre of the trunk[171], one properly made borehole can
be used for 20 - 30 years[64]. The resin has a wide range of
uses including wood preservatives, medicinal etc. The hole is
made in the spring and the resin extracted in the autumn[64].
The roots have been used as a sewing material in canoes and
to make durable bags[257]. The bark contains tannin[229].
Wood - very strong, heavy, hard, durable even in water. It
weighs 39lb per cubic foot and is used for telegraph poles,
fence posts etc[46, 61, 171, 226, 235]. The roots are often
curved by as much as 90° and are used by builders of small
ships[226].

dwatta Alternative Astringent Disinfectant Diuretic Ex-
pectorant Laxative Poulitice Salve Tonic Tamarack was em-
ployed medicinally by a number of native North American In-
dian tribes who used it to treat a variety of complaints[257].
It is little used in modern herbalism. A tea made from the
bark is alterative, diuretic, laxative and tonic[4, 222]. It

Use in the treatment of jaundice, anaemia, rheumatism, colds and skin ailments[222, 257]. It is gargled in the treatment of sore throats and applied as a poultice to sores, swellings and burns[222, 257]. A tea made from the leaves is astringent[4, 222]. It is used in the treatment of piles, diarrhoea etc[222]. An infusion of the buds and bark is used as an expectorant[257]. The needles and inner bark are disinfectant and laxative[257]. A tea is used in the treatment of coughs[257]. A poultice made from the warm, boiled inner bark is applied to wounds to draw out infections, to burns, frostbite and deep cuts[257]. The resin is chewed as a cure for indigestion[222]. It has also been used in the treatment of kidney and lung disorders, and as a dressing for ulcers and burns[226].

nrakta Northern N. America - Alaska to Labrador, south to West Virginia. **ksakta** Often forming pure forests in the south of its range in swamps and wet soils[43, 82, 222], sometimes also on dry plateau or slopes in the north of its range[82, 226].

propta Seed - sow late winter in pots in a cold frame. One month cold stratification helps germination[113]. It is best to give the seedlings light shade for the first year[78]. As soon as they are large enough to handle, prick out the seedlings into individual pots. Although only a few centimetres tall, they can be planted out into their permanent positions in the summer providing you give them an effective weed-excluding mulch and preferably some winter protection for their first year. Otherwise grow them on in the cold frame for their first winter and plant them out in early summer of the following year. The seed remains viable for 3 years[113] If you are growing larger quantities of plants, you can sow the seed in an outdoor seedbed in late winter. Grow on the seedlings in the seedbed for a couple of years until they are ready to go into their permanent positions then plant them out during the winter.

nwatta Landscape Uses: Specimen. Prefers an open airy position in a light or gravelly well-drained soil[200]. Plants are intolerant of shade[226]. Tolerates acid and infertile soils and waterlogged soils[200]. Succeeds on rocky hill or mountain sides and slopes[200]. A north or east aspect is more suitable than west or south[1]. This species is very cold-hardy when fully dormant, but the trees can be excited into premature growth in Britain by mild spells during the winter and they are then very subject to damage by late frosts and cold winds[1]. Hybridizes freely with other members of this genus[200]. Planted for forestry in Europe[50], they are not suitable for this purpose in Britain[1]. Growth is normally slow in this country with average height increases of less than 30cm per year[185]. The trees are generally not long-lived[185]. Planting them in boggy soil may improve growth rates[185]. Open ground plants, 1 year x 1 year are the best for planting out, do not use container grown plants with spiralled roots[200]. Plants transplant well, even when coming into growth in the spring[200]. Plants in this genus are notably resistant to honey fungus[200]. Special Features: North American native, Wetlands plant, Attractive flowers or blooms.

3.2.32 *Picea glauca*

White Spruce, Black Hills Spruce, Canadian Spruce
2 tlin 6 cyuc 2 kcaak 3 tcan 2 dwat 15 m hkuc
htut cyutli tcuphja7n hwicli vyhysrasjutnyikfrip hpa7tli frusflatprik hpa7tmwatli hjonli

drutta *Picea glauca* is an evergreen Tree growing to 15 m (49ft) by 5 m (16ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in leaf all year, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay and nutritionally poor soils. 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. The plant can tolerate strong winds but not maritime exposure. It cannot tolerate atmospheric pollution.

kcakta Edible Parts: Flowers Inner bark Seed Seed-pod Edible Uses: Condiment Gum Tea Young male catkins - raw or cooked. Used as a flavouring[172]. Immature female cones - cooked. The central portion, when roasted, is sweet and syrupy[172]. The cones are about 5cm long[82]. Inner

bark - raw or cooked[257]. It can be dried, ground into a powder and then used as a thickener in soups etc or added to cereals when making bread[172]. Usually harvested in the spring[257], it is an emergency food that is only used when all else fails. Seed - raw[172]. The seed is about 2 - 4mm long[229] and is too small and fiddly to be worthwhile unless you are desperate[172]. A refreshing tea, rich in vitamin C, can be made from the young shoot tips[172]. The trunk yields a gum, used for chewing[183, 257]. Spruce oil, distilled from the leaves and twigs, is used in the food industry to flavour chewing gum, ice cream, soft drinks and sweets[183].

tcanta Baby care Dye Gum Musical Pitch Repellent Shelterbelt String Tannin Waterproofing WoodA fairly wind resistant tree, it can be grown as part of a shelterbelt planting[200]. The cultivar 'Denstat' has been recommended[200]. The leaves have been burnt to repel insects[257]. Various native North American Indian tribes made a string from the long roots of this species and used it to stitch the bark of their canoes and to make baskets etc[226, 257]. The rotten, dried, finely powdered wood has been used as a baby powder and as a treatment for skin rashes[257]. The bark is a source of tannin[226]. A yellow-brown dye can be obtained from the rotten wood[257]. The pitch obtained from the trunk can be used as a waterproofing sealant in canoes[257]. Wood - straight-grained, resilient, light, soft, not strong. Used for construction and as a source of pulp for paper making[46, 61, 171, 229]. The resonance of the wood, and its capacity to transmit vibrations, make it an ideal wood for guitars, violins, piano soundboards etc[226].

dwatta Antiseptic Digestive Diuretic Laxative Pectoral Poultice Salve Skin TB Urinary Vitamin CWhite spruce was widely employed medicinally by several native North American Indian tribes, who valued it especially for treating chest complaints[257]. It is little, if at all, used in modern herbalism. An infusion of the cones has been used in the treatment of urinary troubles[257]. The inner bark is pectoral[257]. It has been chewed, and an infusion drunk, in the treatment of TB, influenza, coughs and colds[257]. An infusion is also drunk in the treatment of rheumatism[257]. The inner bark has also been used as a poultice on sores and infected areas, and has also been used to bandage cuts[257]. The tea made from the young shoot tips has antiseptic properties[226]. It is used in the treatment of respiratory infections[257]. A decoction of the stems is used as a herbal steam bath in the treatment of rheumatism[257]. The gum is antiseptic, digestive, laxative, pectoral and salve[257]. A decoction has been used in the treatment of respiratory complaints[257]. The gum obtained from the trunk (probably pitch[K]) has been used as a salve on sores and cuts[257]. A poultice of the gum mixed with oil has been used to treat skin rashes, scabies, persistent scabs, growing boils etc, and has also been used on wounds where there is blood poisoning[257]. The rotten, dried, finely powdered wood has been used as a baby powder and as a treatment for skin rashes[257].

nrakta Northern N. America - Alaska to Newfoundland. **ksakta** Woods in good soils[43]. Along streams and lakes and also on rocky hills and slopes, succeeding in a variety of soil conditions[229].

propta Seed - stratification will probably improve germination so sow fresh seed in the autumn in a cold frame if possible[80]. Sow stored seed as early in the year as possible in a cold frame[78]. A position in light shade is probably best[78]. Seed should not be allowed to dry out and should be stored in a cool place[80]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the greenhouse or cold frame for their first winter. They can be planted out into their permanent positions in early summer of the following year, or be placed in an outdoor nursery bed for a year or so to increase in size. They might need protection from spring frosts. Cuttings of semi-ripe terminal shoots, 5 - 8cm long, August in a frame. Protect from frost. Forms roots in the spring[78]. Cuttings of mature terminal shoots, 5 - 10cm long, September/October in a cold frame. Takes 12 months[78]. Cuttings of soft to semi-ripe wood, early summer in a frame. Slow but sure.

nwatta Landscape Uses: Christmas tree, Firewood, Screen, Specimen. Likes abundant moisture at the roots, if grown in drier areas it must be given a deep moist soil[11]. Tolerates poor peaty soils[200]. Succeeds in wet cold and shallow soils but is not very wind-firm in shallow soils[1]. Prefers a pH between 4 to 6[200]. Dislikes shade[200]. Intolerant of atmospheric pollution[11]. Resists wind exposure

one degree to [200]. A fast growing tree, especially when young with annual increases of up to 1 metre in height[185]. New growth takes place from April to July. Growth slows considerably as the trees grow older[185]. It is an important forestry tree in N. America and is also planted for timber in N. Europe. It is sometimes used as a 'Christmas tree', but is unsuited for this because its leaves quickly fall[226]. Seed production begins at approximately 20 years, though reliable crops make take twice that long[229]. Heavy crops are produced every 2 - 5 years[229]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. In some upland areas, especially over granitic or other base-poor soils, growth rate and health have been seriously affected by aluminium poisoning induced by acid rain[200]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. There are some named varieties selected for their ornamental value[200]. The crushed leaves are quite aromatic. Some people find the smell distasteful saying that it is like skunks[226], whilst others say it has a pleasant smell like blackcurrants or mouldy grapefruit[185]. Special Features:North American native, Inconspicuous flowers or blooms.

3.2.33 *Malus baccata*

Chinese Crab, Siberian crab apple
2 tlin 7 cyuc 2 kcaak 2 tcan 1 dwat 15 m hkuc
hmimhty cyutli tcup hwicli hrsajlutnyikfrip hpa7tli flatprik-
wis hpa7tmwatli fyfjxre7t hjonli

drutta *Malus baccata* is a deciduous Tree growing to 15 m (49ft) by 15 m (49ft) 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 in October. 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, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[46, 105]. Fruit from the typical species is about 1cm in diameter, though there are sub-species and cultivated forms with considerably larger fruits[200]. A sour taste, but the fruit is palatable[2, K]. It is often dried for winter use[61] and also makes an excellent jelly[183].

tcanta RootstockThe plant can be used as a rootstock for apple cultivars. It produces a vigorous tree that has more cold tolerance and disease resistance[183]. It is commonly used as stock to graft *Malus pumila* and *M. asiatica* in N and NE China[266]. The sub-species *M. baccata himalaica* is more often used for this purpose. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta AnodyneA paste of the fruit is applied to the forehead to relieve headaches[272].

nrakta E. Asia - N. China to the Himalayas. ksakta Open forested areas to elevations of 1800 - 3600 metres[51, 272].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. It usually germinates in late winter. Stored seed requires stratification for 3 months at 1°C and should be sown in a cold frame as soon as it is received[200]. It might not germinate for 12 months or more. Prick out the seedlings into individual pots as soon as they are large

enough to handle. If given a rich compost they usually grow away quickly and can be large enough to plant out in late summer, though consider giving them some protection from the cold in their first winter. Otherwise, keep them in pots in a cold frame and plant them out in late spring of the following year. Cuttings of mature wood, November in a frame[11].

nwatta Landscape Uses:Border, Espalier, Pest tolerant, Standard, Specimen, Street tree. An easily grown plant, it succeeds in most fertile soils including heavy ones[1, 98], preferring a moisture retentive well-drained loamy soil[200]. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[200]. A very hardy plant, tolerating temperatures down to about -40°C[160]. The plants are very resistant to disease[34]. This species is cultivated for its edible fruit in China, there are several named varieties[22]. The sub-species *M. baccata mand-schurica*. (Maxim.)Schneid. has slightly larger fruits which ripen earlier than the type[1, 200]. Trees can produce fruit in 4 years from seed[160]. A very ornamental tree[1], the fruit is a good wildlife food source, especially for birds[200]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Not North American native, Fragrant flowers, Attractive flowers or blooms. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

3.2.34 *Pinus banksiana*

Jack Pine

2 tlin 7 cyuc 2 kcaak 0 tcan 2 dwat 12 m hkuc
htuc ytmli hgakuyctcup hwicli hyishrsajlut hpa7tli flatprik-
hpa7tmwatli dyat hjonli

drutta *Pinus banksiana* is an evergreen Tree growing to 12 m (39ft) by 5 m (16ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. 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 or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

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

kcakta Edible Parts: Flowers Inner bark SeedEdible Uses: Condiment DrinkSeed - raw or cooked[177]. Rich in oil with a slightly resinous flavour[K]. They are very small and fiddly to utilize, being only 2 - 3mm long[200]. Young cones - cooked[177]. Inner bark[257]. No more information is given, but the bark can usually be eaten raw or cooked. It can also be dried, then ground into a powder and used as a thickener in soups or can be mixed with cereal flours when making bread etc[K]. A refreshing drink is made from the leaves[159, 177]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulp-wood[200].

tcanta Dye Herbicide String WoodA tan or green dye is obtained from the needles[168]. Various native North American Indian tribes made a string from the long roots of this species and used it to stitch the bark of their canoes[226, 257]. In a sandy soil, the roots of this species extend near the surface of the soil for perhaps 10 metres and are easy to pull out of the ground for their entire length. When gathered, they were made into coils and sunk beneath the surface of water until the outer bark had loosened from the root. They were then peeled and split in half, each half

being a serviceable cord for sewing together canoes and bark strips intended for the roofs of wigwams and other purposes[257]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc[257]. Wood - fairly light, soft, coarse, weak[46, 61, 82, 226]. It weighs 27lb per cubic foot[235]. It is mainly used for fuel, though occasionally also for posts, pulp and lumber[46, 61, 82, 226].

dwatta Antiseptic Diuretic Expectorant Poultice Rubefacient VermifugeThe 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]. A poultice of the inner bark has been used in the treatment of deep cuts[257]. The leaves have been used in a herbal steam bath to clear congested lungs[257]. They have also been used as a fumigant to revive a comatose patient[257].

nrakta Northern N. America - Alaska to Northwest Territory, south to New York, Illinois and Minnesota. ksacta Barren sandy or rocky soils[43], sometimes forming extensive forests[235]. Fire successional in boreal forests, tundra transition, dry flats, and hills, sandy soils, sea level to 800 metres[270].

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

nwatta Landscape Uses:Screen. Thrives in a light well-drained sandy or gravelly loam[1]. The trees have an extensive root system and are well adapted for growing in poor sandy soils[11, 226], they are often used as a pioneer tree for reforestation[226]. Dislikes poorly drained moorland soils and shady positions[1]. Starts away well on almost any soil, whether poorly drained or shallow and dry[185]. Established plants tolerate drought[200]. A fast growing tree when young[200], but growth soon slows down and the tree is short-lived in Britain with no tree known to be older than 75 years[185]. New shoots can be almost 1 metre long, though the tree remains spindly[185]. An open-topped tree, though plants sometimes have a shrubby habit of growth[82]. They can start producing seed when only a few years old[82]. The cones are 4- 5cm long[82]. They ripen in their second year but can remain un-opened on the tree for a number of years,

only opening and shedding their seed after a forest fire has heated them to at least 50°C[226]. This makes them one of the first colonizers of burnt land[226]. Cultivated for timber in C. Europe[50]. 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 the closely related *P. contorta* where their ranges overlap[226, 270]. There are several named varieties selected for their ornamental value[200]. Leaf secretions inhibit the germination of seeds, thereby inhibiting the growth of other plants below the tree[18]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features:North American native, Inconspicuous flowers or blooms.

3.2.35 *Viburnum dentatum*

Arrow Wood, Southern arrowwood, Southern Arrowwood
Viburnum
2 tlin 8 cyuc 2 kcaok 0 tcan 1 dwat 4.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis
hpa7tmwatli dyatxre7t hjonli

dwatta *Viburnum dentatum* is a deciduous Shrub growing to 4.5 m (14ft 9in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from July to August. 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.

kcaoka Edible Parts: FruitEdible Uses: Fruit - raw or cooked. A pleasantly sweet flavour, but there is very little edible flesh surrounding a relatively large seed[K]. The fruit is up to 9.5mm in diameter[200].

dwatta Birthing aid ContraceptiveA decoction of the twigs has been taken by women to prevent conception[257]. A poultice of the plant has been applied to the swollen legs of a woman after she has given birth[257]. Both of the above uses are for the sub-species *V. dentatum lucidum*. Ait.[257].

nrakta Eastern N. America - New Brunswick to Ontario and New York, south to Georgia and Florida. ksacta Moist soils[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:Border, Massing, Screen, Seashore, Specimen, Woodland garden. 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]. Plants 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:Attracts birds, North American native, Attracts butterflies, Blooms are very showy.

3.2.36 *Cornus sericea*

Red Osier Dogwood, Western dogwood
2 tlin 7 cyuc 2 kcaak 4 tcan 2 dwat 2.5 m hkuc
hmmimhtut cyutli tcuphja7n hwicli hrasljutnyikfrp hpa7tli flat-
prikilwis hpa7tmwatli xre7t hjonli

drutta *Cornus sericea* is a deciduous Shrub growing to 2.5 m (8ft) 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 from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil.

kcakta Edible Parts: Fruit Oil Oil Seed Edible Uses: Oil Oil Fruit - raw or cooked[105, 161, 257]. Juicy[101]. Bitter and unpalatable according to some reports[2], it was mixed with other fruits such as juneberries (*Amelanchier* spp) and then dried for winter use by native North Americans[257]. The fruit can cause nausea[172]. The fruit is up to 9mm in diameter[200]. Seed[101]. No more details are given, but the seeds are quite small and woody, looking rather less than edible[K]. An edible oil is obtained from the seed[4].

tcanta Basketry Dye Fibre Fodder Miscellany Oil Oil TeethA fibre obtained from the bark is used as cordage[99]. The bark can be twisted into a rope[257]. The powdered bark has been used as a toothpowder to preserve the gums and keep the teeth white[4]. An oil obtained from the seed burns well and can be used in lighting[4]. A red dye can be obtained from the bark mixed with cedar ashes[257]. The branches are pliable, they are used as rims in basket making[99, 257]. The stem wood is very tough and flexible[212]. Plants can be grown as a tall ground cover for colonising large areas. The cultivar 'Flaviramea' has been recommended[208]. Red osier is noted as a good Carbon Farming Solution plant. It can be coppiced, used as fodder and act as a living fence. It is an industrial biomass crop.

dwatta Analgesic Astringent Febrifuge Miscellany Poul-
tice Purgative Skin Stimulant Tonic Red osier dogwood was widely employed by several native North American Indian tribes who valued it especially for its astringent and tonic bark, using it both internally and externally to treat diarrhoea, fevers, skin problems etc[257]. It is little used in modern herbalism. The bark and the root bark are analgesic, astringent, febrifuge, purgative, slightly stimulant and tonic[4, 172, 257]. Drying the bark removes its tendency to headache[172]. A decoction has been used in the treatment of pyrethases, diarrhoea, coughs, colds and fevers[257]. Externally, the decoction has been used as a wash for sore eyes, stytes and other infections and also to treat skin complaints such as poison ivy rash and ulcers[257]. The bark shavings have been applied as a dressing on wounds to stop the bleeding[257]. A poultice of the soaked inner bark, combined with ashes, has been used to alleviate pain[257]. The plant is said to have cured hydrophobia[4].

nrakta N. America - Newfoundland to New York, west to Alaska and California. Naturalized in Britain[17]. ksacta Shores and thickets[43]. Along streams, rivers and moist sites, 450 - 2700 metres[229].

propta Seed - best sown as soon as it is ripe in a cold frame or in an outdoors seedbed if there is sufficient seed[80, 113]. The seed must be separated from the fruit flesh since this contains germination inhibitors[80, 164]. Stored seed should be cold stratified for 3 - 4 months and sown as early as possible in the year[164]. Scarification may also help as may a period of warm stratification before the cold stratification[80, 164]. Germination, especially of stored seed, can be very slow, taking 18 months or more[164]. Prick out the seedlings of cold-frame sown seeds into individual pots as soon as they are large enough to handle and grow the plants on for their first winter in a greenhouse, planting out in the spring after the last expected frosts. Cuttings of half-ripe side shoots, July/August in a frame. Cuttings of mature wood of the current year's growth, taken with a heel if possible, autumn in a cold frame. High percentage[78]. Layering of new growth in June/July. Takes 9 months[78].

nwatta Agroforestry Services: Living fence Fodder: Bank Industrial Crop: Biomass Management: Cop-
pice Regional CropAn easily grown plant, it succeeds in any soil of good or moderate fertility[1], ranging from acid to

shallow chalk[200]. Grows well in heavy clay soils. Prefers a moist soil and a position in sun or partial shade[108]. Succeeds in poorly drained soils[200]. Plants are hardy to about -35°C[184]. A rampant suckering shrub[1]. A number of cultivars have been developed for their ornamental value[182]. This species is closely allied to *C. alba*[11]. The flowers are very attractive to bees[108]. 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. The plant growth habit is multistemmed with multiple stems from the crown [1-2].

3.2.37 *Matteuccia struthiopteris*

Ostrich Fern

2 tlin 7 cyuc 2 kcaak 2 tcan 1 dwat 1 m hkuc
hmmimhtut tcup hwicli hrasljutnyikfrp hpa7tli frusflatprik-
hpa7tmwatli hjonli

drutta *Matteuccia struthiopteris* is a FERN growing to 1 m (3ft 3in) by 0.5 m (1ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It can grow in semi-shade (light woodland). It prefers moist soil.

pcista Although we have found no reports of toxicity for this species, a number of ferns contain carcinogens so some caution is advisable[200]. Many ferns also contain thiaminase, an enzyme that robs the body of its vitamin B complex. In small quantities this enzyme will do no harm to people eating an adequate diet that is rich in vitamin B, though large quantities can cause severe health problems. The enzyme is destroyed by heat or thorough drying, so cooking the plant will remove the thiaminase[172].

kcakta Edible Parts: Leaves Root Edible Uses: Young fronds - raw or cooked[62, 102, 116, 172]. Used before they fully unroll, they are thick and succulent[183]. Sometimes sold in speciality markets, the flavour can be compared to asparagus[200]. Another report says that they are a famine food that is only used in times of need in China[177]. Root-stock - peeled and roasted[106, 172, 183].

tcanta Miscellany Plants make a good ground cover[200] when spaced about 60cm apart each way[208]. They spread slowly and the fronds tend to die off earlier in the autumn than most ferns[208].

dwatta Birthing aid Miscellany A decoction of the leaf stalk base from sterile fronds has been taken in the treatment of back pain and also to help speed up the expulsion of the afterbirth[257].

nrakta N. Temperate zone. Occasionally naturalized in Britain. ksacta Light shade on rocky stream banks, forming extensive colonies[187]. Wooded ravines in Turkey, 650 - 1200 metres[93].

propta Spores - surface sow as soon as they are ripe in mid-winter and keep the soil moist. It is best to keep the pot in a sealed plastic bag to hold in the moisture. Pot up small clumps of the young plants as soon as they are large enough to handle and grow on in light shade until large enough to plant out. Division during the dormant season between October and March[1]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Landscape Uses: Border, Container, Specimen, Woodland garden. Requires a moist but well-drained position and light shade[1, 187]. Grows well in heavy clay soils. Dislikes full sun, the leaves turning yellow and burning in such a situation[200]. Prefers a pH between 5 and 6.5[200]. Dormant plants are hardy to at least -20°C[200]. Members of

This genus are rarely if ever troubled by browsing deer[233]. A very ornamental plant[1], it establishes rapidly[187]. It has a short rhizome but produces long stolons, by which it spreads rapidly once established[187], and it can be invasive[200]. Fertile fronds are produced after the first flush of vegetative fronds and persist throughout the following winter. The spores are shed in mid-winter[200]. Grown commercially for its decorative fronds[106]. These fronds are also available as a food from speciality markets[183, 200]. Plants can be forced in the winter to provide an early supply of the young shoots[183]. Special Features: Attractive foliage, North American native, Invasive, There are no flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

3.2.38 *Tagetes tenuifolia*

Lemon Marigold, Striped Mexican Marigold, Signet Marigold
2 tlin 11 cyuc 2 kcaak 3 tcan 0 dwat 0.8 m hkuc
htut cyutli kyucutcp hwicli hrasjlutnyikfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Tagetes tenuifolia* is an ANNUAL growing to 0.8 m (2ft 7in) by 0.8 m (2ft 7in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. 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: Condiment The flowers of some cultivars have a pleasant citrus-like flavour and can be used sparingly as a flavouring in salads, sandwiches, wines etc or used as a garnish[183].

tcanta CompanionLandscape Uses: Border, Container, Specimen. There are some named forms, selected for their ornamental value[183]. Special Features: Attractive foliage, North American native, Fragrant foliage, Suitable for cut flowers, Suitable for dried flowers. Secretions from the roots of growing plants have an insecticidal effect on the soil, effective against nematodes and to some extent against keeled slugs, they also have an effect against some persistent weeds such as couch grass[18, 20, 200]. The plant also has an effect on asparagus beetle and bean weevils. These secretions are produced about 3 - 4 months after sowing. A yellow dye is obtained from the flowers[169]. Dynamic accumulator.

nrakta C. and S. America - Mexico to Guatemala. ksacta Not known

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]. There are some named forms, selected for their ornamental value[183]. The bruised foliage is perhaps more refreshingly aromatic than any other plant[245]. The lemon verbena-like smell remaining on the fingers for an hour or more after touching the plant[245]. Removing dead flowers before the seed is formed will extend the flowering season[188]. Plants are prone to slugs, snails and botrytis[188]. Grows well with tomatoes[20].

3.2.39 *Tagetes patula*

French Marigold, Dwarf French Marigold
2 tlin 11 cyuc 2 kcaak 4 tcan 2 dwat 0.5 m hkuc
htut cyutli kyucutcp hwicli hrasjlutnyikfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Tagetes patula* is an ANNUAL growing to 0.5 m (1ft 8in) by 0.3 m (1ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is frost tender. It is in flower from July to October, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, 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: Edible Uses: Colouring Condiment Drink The flowers are used in refreshing drinks[177, 183]. The leaves are used as a food flavouring[183, 238]. No further details are given. The essential oil is used as a food flavouring, though it is inferior to the oil obtained from *T. minuta*[238]. The dried flowers are an adulterant of saffron (*Crocus sativus*), used for colouring foods yellow[183, 238].

tcanta Companion Dye Essential Insecticide Repellent-Landscape Uses: Border, Container, Foundation, Massing, Seashore, Specimen. A very ornamental plant[1]. Special Features: North American native, Fragrant foliage, Naturalizing, Suitable for cut flowers, Suitable for dried flowers. Secretions from the roots of growing plants have an insecticidal effect on the soil, effective against nematodes and to some extent against keeled slugs[18, 20, 200, 218]. These secretions are produced about 3 - 4 months after sowing[200]. The whole plant is harvested when in flower and distilled for its essential oil[218, 238]. The oil is used in perfumery, it is blended with sandalwood oil to produce 'attar genda' perfume[238]. About 35 kilos of oil can be extracted from 1 hectare of the plant (yielding 2,500 kilos of flowers and 25,000 kilos of herbage)[218]. The whole plant contains substances that are toxic to cockroaches[218]. The growing plant repels whitefly and can be grown near tomatoes to keep that crop free of the insect[18, 20]. A yellow dye is obtained from the flowers[169]. It is used to colour foods and textiles[238]. The flowers are sometimes used as an adulterant of saffron (obtained from *Crocus sativus*)[238]. Dynamic accumulator.

dwatta Aromatic Digestive Diuretic Dysentery Sedative The whole herb is aromatic, digestive, diuretic and sedative[238]. It is used internally in the treatment of indigestion, colic, severe constipation[238], coughs and dysentery[218]. Externally, it is used to treat sore eyes and rheumatism[238]. 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].

nrakta Southern N. America - Mexico. ksacta The pine-oak forest zone[181]. Naturalized in California where it grows on waste ground[71].

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]. A very ornamental plant[1], there are many named varieties[188]. A good butterfly plant[30]. Removing dead flowers before the seed is formed will extend the flowering season[188]. The bruised leaves emit a refreshing pungent smell[245]. Plants are prone to slugs, snails and botrytis[188]. The French marigold is often used as a companion plant, especially for growing amongst tomatoes and potatoes where it helps to repel pests[238]. See 'Other uses' below for more details.

3.2.40 *Andromeda polifolia*

Marsh Andromeda, Bog rosemary
2 tlin 6 cyuc 2 kcaak 0 tcan 1 dwat 0.3 m hkuc
hmim cyutli tcuphja7n hwicli hrasjlut hpa7tli frusflat
hpa7tmwatli fyifxre7t hjonli

drutta Andromeda polifolia is an evergreen Shrub growing to 0.3 m (1ft) by 0.6 m (2ft in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in leaf all year, in flower from May to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in semi-shade (light woodland). It prefers moist or wet soil.

pcista A toxin, called 'andromedotoxin' can be released from the plant if it is infused in boiling water[183]. See notes below regarding use of the plant for tea.

kcakta Edible Parts: Edible Uses: TeaThe tender leaves and shoot-tips are boiled as an aromatic tea[161, 177]. A delicious drink[183]. Some caution is advised since boiling the plant or infusing it in hot water is said to release a toxic chemical[183]. It is safer to soak the leaves in a jar of water in direct sunlight to make 'sun tea'[183].

tcanta TanninTannin is obtained from the leaves and twigs[61].

dwatta PectoralThe plant is used as a respiratory aid in the treatment of catarrh[257].

nrakta Northern temperate regions, in Europe, including Britain, Asia and America. ksakta Bogs, rarely on wet heaths, at altitudes up to 500 metres[17]. Rare and decreasing in the south of Britain[17].

propta Seed - sow February/March in an acid compost in the greenhouse. Surface sow or only just cover the seed and place in a lightly shaded position[78, 133]. The seed usually germinates in 1 - 2 months at 12°C[133]. Prick out the young seedlings into individual pots as soon as possible, they are prone to damp-off and so should be kept well ventilated[78]. Grow them on in the greenhouse for at least their first winter and plant them out in early summer once they are 15cm or more tall. Cuttings of half-ripe wood, 5 - 7cm with a heel, July/August in a frame in a shady position. Takes 15 months[78]. Layering in August in a semi-shady position. Takes 18 months[78]. Division in early spring. The plants should be 'dropped' beforehand[78]. This entails digging up the plant 6 to 12 months earlier and replanting it somewhat more deeply. The buried branches will then root and form new plants when divided.

nwatta Landscape Uses:Border, Container, Rock garden, Specimen. Requires a well-drained, moisture-retentive, lime-free, humus-rich soil and a shady position[133, 182, 200]. Plants spread slowly by means of suckers when they are grown in a suitable position[182]. A very ornamental plant, there are many named varieties[182]. Special Features:North American native, Attractive flowers or blooms.

3.2.41 *Coptis trifolia*

Goldthread, Threelaf goldthread

2 tlin 7 cyuc 2 kcak 2 tcan 2 dwat 0.2 m hkuc

hmim cyutli tcup hwicli hrasjlutnyik hpa7tli flat hpa7tmwatli xre7t hjonli

drutta *Coptis trifolia* is an evergreen Perennial growing to 0.2 m (0ft 8in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 2. It is in leaf all year, in flower in May. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid soils. It can grow in semi-shade (light woodland). It prefers moist soil.

pcista Although no specific mention of toxicity has been found for this species, it belongs to a family that contains many species that are mildly toxic and so it is wise to treat this plant with some caution.

kcakta Edible Parts: LeavesEdible Uses: CondimentThe whole plant is said to be eaten[105, 177], or it can be mixed with sassafras-root bark and Irish moss and brewed into a kind of herbal root beer[183]. This plant contributes a bitter flavour and a yellow colour to the beverage[183]. Some caution is advised, see the notes above on toxicity.

tcanta DyeA yellow dye is obtained from the leaves and stems[207]. Can be grown as a ground cover plant in the peat garden[200].

dwatta Antibacterial Antiinflammatory Antiphlogistic Astringent Sedative Skin Stomachic TonicGoldthread is a very bitter tasting herb that was formerly highly valued and widely used in North America by the native Indians and

white settlers alike, though it is little used in modern herbalism[254]. It was employed mainly to treat any soreness in the mouth[254]. The dried roots, stems and leaves are antiphlogistic, highly astringent, sedative, stomachic, tonic[4, 21, 46, 61, 207, 222]. The plant is valued as a local application in the treatment of thrush in children[4]. It is also used in the treatment of ulcerated mouths and as a gargle for sore throats or mouths[21, 46, 61, 207, 213]. It is said to be useful in the treatment of dyspepsia and helpful in combating the drink habit[4]. The plant contains the alkaloid 'berberine', which is a mild sedative[213], anti-inflammatory and antibacterial[222]. The root is collected in the autumn and dried for later use[213].

nrakta North, eastern and western N. America through northern Asia to Japan. ksakta Wet to mesic, coniferous and mixed forests, bogs, willow scrub, and tundra, often associated with mosses from sea level to 1500 metres[270].

propta Seed - best sown in a greenhouse as soon as it is ripe in an ericaceous compost[164]. Seal the pot in a polythene bag until germination takes place, which is usually within 1 - 6 months at 10°C[164]. Stored seed should be sown as early in the year as possible. Four weeks cold stratification may be beneficial[164]. Prick out the seedlings into individual pots when they are large enough to handle and grow on in a shady part of the greenhouse for at least their first winter. Plant them out in mid-autumn or in spring. Division in spring[200].

nwatta Requires a light moist humus-rich slightly acidic soil with a northerly aspect or light shade[1, 200]. A very ornamental plant[1]. The sub-species *C. trifolia groenlandica* (Syn *C. groenlandica*) is the form used medicinally in N. America[222]. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4 3 tlin

4.1 bwon

4.1.1 *Hippophae salicifolia*

Willow-Leaved Sea Buckthorn

tfo2n 3 tlin 7 cyuc 5 kcak 5 tcan 3 dwat 15 m hkuc

htut cyutli kyuctcuphja7n hwicli yhishrasjlutnyik hpa7tli flat-priklwis hpa7tmwatli nyanhjen hjonli

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

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[2, 46]. A very nutritious food, and possibly the most nutritious fruit that can be grown in temperate climates. It is very rich in vitamins, especially vitamin C, plus minerals and bioflavonoids, and is also a source of essential fatty

acid[s][214]. It comes ripe in late summer, though it can be eaten for about a month before this, and will hang on the tree until mid-winter, by which time the flavour has become much milder, though it has also become very soft and difficult to pick[K]. We and many of our visitors really like this fruit, however the flavour is somewhat like a sharp lemon and a lot of people find this too acid for them[K]. It also makes a good salad dressing[K]. The fruits of some species and cultivars (not specified) contain up to 9.2% oil[214]. The fruit is used for making preserves[105, 183]. It is being increasingly used in making fruit juices, especially when mixed with other fruits, because of its reputed health benefits[214]. The fruit becomes less acid after a frost or if cooked[74].

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

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

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

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

nwatta Succeeds in most soils so long as they are not too dry[200]. Grows well by water[1, 11]. A fast-growing and very wind-resistant tree, it is an excellent pioneer species for re-establishing woodlands[K]. This species is not hardy in the colder areas of the country, it tolerates temperatures down to about -10°C[200]. Members of this genus are attracting considerable interest from breeding institutes for their nutrient-rich fruits that can promote the general health of the body (see edible and medicinal uses below)[214]. The deeply cleft bark favours the growth of epiphytes[146]. Plants in this genus are notably resistant to honey fungus[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants

growing nearby[200]. Dioecious. Male and female plants must be grown if seed is required.

4.1.2 Hippophae rhamnoides

Sea Buckthorn, Seaberry
tfo2n 3 tlin 7 cyuc 5 kcah 5 tcan 5 dwat 6 m hkuc
htut cyuthl hgatyuctcuphja7n hwicli hyhshrasljutnyik hpa7tli
flatprikwi hpa7tmwatli nyanhjen hjonli

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

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

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

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

dwatta Astringent Cancer Cardiac Eczema Poultice Tonic Vermifuge Vitamin CThe twigs and leaves contain 4 - 5% tannin[240]. They are astringent and vermifuge[7, 100]. The tender branches and leaves contain bio-active substances which are used to produce an oil that is quite distinct from the oil produced from the fruit. Yields of around 3% of oil are obtained[240]. This oil is used as an ointment for treating burns[214]. A high-quality medicinal oil is made from the fruit and used in the treatment of cardiac disorders, it is also said to be particularly effective when applied to the skin to heal burns, eczema and radiation injury, and is taken internally in the treatment of stomach and intestinal diseases[214]. The fruit is astringent and used as a tonic[9, 254]. The freshly-pressed juice is used in the treatment of colds, febrile conditions, exhaustion etc[9]. The fruit is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is

usually unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214]. The juice is also a component of many vitamin-rich medications and cosmetic preparations such as face-creams and toothpastes[9]. A decoction of the fruit has been used as a wash to treat skin irritation and eruptions[254].

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

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

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

limited spread [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is suckering with new plants from underground runners away from the plant [2-1].

4.1.3 *Apios americana*

Ground Nut
tfo2n 3 tlin 7 cyuc 5 kcak 3 tcan 1 dwat 1.2 m hkuc
hmimhtut cyutli tkcup hwicli hrasljut hpa7tli frusflatprikwlis
hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

nwatta Agroforestry Services: Nitrogen Edible Beans Management: Standard New Crop for Tubers Staple Crop: ProteinPrefers a light rich soil and a sunny position[1, 27]. When grown in a warm dry situation in a well-drained sandy soil, the plants will be long lived with the tuberous roots increasing in size and number each year[245]. Another report says that the plant prefers light dappled shade[200]. It tolerates acid soils[160]. Dislikes windy situations[K]. Groundnut is reported to tolerate an annual precipitation in the range of 97 to 117cm, an average

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

4.1.4 Apios Americana

Ground Nut
 tfo2n 3 tlin 7 cyuc 5 kcaak 3 tcan 1 dwat 1.2 m hku
 hmimhtut cyutli tcup hwicli hrasjlut hpa7tli frusflatprikhwis
 hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

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

4.1.5 Elaeagnus umbellata

Autumn Olive
 tfo2n 3 tlin 7 cyuc 4 kcaak 3 tcan 2 dwat 4.5 m hku
 htut cyutli hgaktyuctcup hwicli hyishrasjlutnyik hpa7tli flatprikhwis hpa7tmwatli xre7t hjonli

drutta Elaeagnus umbellata is a deciduous Shrub growing to 4.5 m (14ft) by 4 m (13ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to June, and the seeds ripen from September to November. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor

soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

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

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

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

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

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

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

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

from the fruit trees by up to 10%. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.1.6 *Hedysarum boreale mackenzii*

Liquorice Root

tf02n 3 tlin 7 cyuc 4 kcaak 0 tcan 0 dwat m hkuc htut cyutli tcup hwicli hrasjltutnyik hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

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

pcista The root is said to be slightly toxic.

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

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

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

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

4.1.7 *Elaeagnus parvifolia*

Autumn olive

tf02n 3 tlin 7 cyuc 4 kcaak 2 tcan 2 dwat 4.5 m hkuc htut cyutli hgatkyuctcup hwicli hyishrasjltutnyik hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

drutta *Elaeagnus parvifolia* is a deciduous Shrub growing to 4.5 m (14ft) by 3 m (9ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to June, and the seeds ripen from September to November. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

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

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

dwatta Astringent Cancer Dysentery The unripe fruit is astringent and is eaten in the treatment of bloody dysentery[272]. The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins

A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

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

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

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

4.1.8 Glycyrrhiza lepidota

American Liquorice

tfo2n 3 tlin 8 cyuc 4 kcak 3 tcan 3 dwat 1 m hkuc
hnmimhtut cyutli tcup hwicli hrasjlut hpa7tli flatprikrlwis
hpa7tmwatli xre7t hjonli

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

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

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

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

dwatta Birthing aid Foot care Odontalgic Poultice Tonic American liquorice was widely employed medicinally by a number of native North American Indian tribes who used it in the treatment of a range of diseases[257]. All parts of the body are medicinal, but the roots are the most active part. This species has properties similar to other liquorices which are widely used medicinally, though this species is rather neglected in modern literature. An infusion of the root is used to speed the delivery of the placenta after childbirth, it is also used to treat coughs, diarrhoea, chest pains, fevers in

children, stomach aches etc[207, 257]. It is also used as a wash or poultice on swellings[257]. The chewed root is retained in the mouth as a treatment for toothache and sore throats[207, 257]. The mashed leaves are used as a poultice on sores[207, 257]. The leaves have been placed in the shoes to absorb moisture[257].

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

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

nwatta Requires a deep well cultivated fertile moisture-retentive soil for good root production[200]. Prefers a sandy soil with abundant moisture[238]. Slightly alkaline conditions produce the best plants[238]. A very deep-rooted plant, it can be difficult to eradicate once it is established[238]. Unless seed is required, the plant is usually prevented from flowering so that it puts more energy into producing good quality roots[238]. Plants are growing very well at Kew[K]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.1.9 Hedysarum boreale

Sweet Vetch, Utah sweetvetch, Northern sweetvetch

tfo2n 3 tlin 7 cyuc 4 kcak 3 tcan 0 dwat 0.1 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikrlwis
hpa7tmwatli xre7t hjonli

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

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

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

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

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

nwatta Easily grown in ordinary garden soil in a sunny position, preferring a deep well-drained sandy loam[1, 200]. Plants strongly resent root disturbance and should be placed in their permanent positions as soon as possible[1]. This

species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

4.1.10 *Gymnocladus dioica*

Kentucky Coffee Tree

tfo2n 3 tlin 8 cyuc 3 kcaok 0 tcan 2 dwat 20 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjltutnyik hpa7tli flatprikwlissiphom hpa7tmwatli nyanhjen hjonli

drutta *Gymnocladus dioica* is a deciduous Tree growing to 20 m (65ft) by 15 m (49ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in June, and the seeds ripen in October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). . The plant is not self-fertile. 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. It can tolerate atmospheric pollution.

pcista The ripe seed contains hydrocyanic acid. This toxin can be destroyed by thoroughly heating the seed for at least 3 hours at 150°C[183]. The seed contains saponins[222]. 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 heat so a long slow baking can destroy them. Saponins are found in many plants, including several that are often used for food, such as certain beans. It is not advisable to eat large quantities of food that contain saponins. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[1].

kcakta Edible Parts: Seed Seedpod Edible Uses: Coffee Seedpod - raw or cooked. The roasted seeds can be eaten like sweet chestnuts[257]. The pulp is sweet[2, 82]. A flavour like caramel[222]. The pods are up to 25cm long and 5cm wide[229]. The roasted seed is a caffeine-free coffee substitute[2, 11, 46, 95, 213]. A bitter flavour[226]. Thorough roasting for at least 3 hours at 150°C is necessary in order to destroy the poisonous hydrocyanic acid that is found in the seed[183]. Seed - roasted and eaten like a nut[161, 213, 226]. The seed contains toxic substances, see notes above.

tcanta Insecticide Miscellany Soap Soil reclamation Wood The fruit is high in saponins and is used as a soap[200]. The leaves are used as a fly poison[222]. Trees are planted on the spoil tips of mines to stabilize and reclaim the soil[200]. Wood - coarse-grained, heavy though not hard, strong, very durable in contact with the soil, finishes to a fine lustre. A handsome wood, it weighs 43lb per cubic foot and is used for cabinet work, furniture, construction, fencing etc[46, 61, 82, 171, 229, 235].

dwatta Homeopathy Miscellany The pulverised root bark is used as an effective enema[213, 222, 257]. A tea made from the bark is diuretic[222]. It is used in the treatment of coughs due to inflamed mucous membranes and also to help speed up a protracted labour[222]. A snuff made from the pulverised root bark has been used to cause sneezing in comatose patients[257]. A tea made from the leaves and pulp from the pods is laxative and has also been used in the treatment of reflex troubles[222]. A decoction of the fresh green pulp of the unripe fruit is used in homeopathic practice[82].

nrakta Eastern and Central N. America - New York to Tennessee, west to Arkansas and South Dakota. ksakta Prefers deep rich soils in bottomlands, deep ravines and moist lower slopes[229].

propta Seed - best sown in a greenhouse as soon as it is ripe[200]. The seed can also be sown in early spring in a greenhouse[78]. Scarification and pre-soaking the seed for 24 hours in warm water, especially if it has been stored, will

improve germination[200]. Make sure the seed has swollen after soaking, soak it again if it has not and, if it still does not swell, try fying away some of the seedcoat but be careful not to damage the embryo. As soon as they are large enough to handle, prick the seedlings out into fairly deep individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Consider giving them some protection against the cold for their first couple of winters outdoors Root cuttings 4cm long and 1cm thick in a greenhouse in December[200]. Plant the roots horizontally in pots[78]. Good percentage.

nwatta Landscape Uses: Pest tolerant, Specimen, Street tree. Requires a deep rich soil and a sunny position[1, 200]. Tolerates drought, atmospheric pollution, salt and limestone soils[200]. A very cold-hardy plant, tolerating temperatures down to about -30°C[200]. A very ornamental[1] but slow growing tree[11], it rarely flowers in Britain, requiring more summer heat than it usually gets here[11, 200]. Trees in the wild seldom live longer than 100 years[229]. The tree has a light canopy so does not cast much shade[200], making it a good tree to use for the top canopy of a woodland garden. Dioecious. Male and female plants must be grown if seed is required. Unlike most members of the Leguminosae, his species does not form nodules of nitrogen-producing bacteria on the roots[274]. Special Features: North American native, Fragrant flowers, Inconspicuous flowers or blooms.

4.1.11 *Shepherdia argentea*

Buffalo Berry, Silver Buffaloberry,

tfo2n 3 tlin 9 cyuc 3 kcaok 4 tcan 1 dwat 4 m hkuc
hmimhtut cyutli hgatkuyctcup hwicli hyishrasjltutnyik hpa7tli flatprikwlis hpa7tmwatli nyanhjen hjonli

drutta *Shepherdia argentea* is a deciduous Shrub growing to 4 m (13ft) by 4 m (13ft) 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 March, and the seeds ripen from July to December. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). . 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[1].

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[1, 2, 11, 61, 161, 257]. It can also be dried and used like currants[3, 46]. A tart but pleasant flavour even before a frost[85, 183], it becomes sweeter after frosts[3, 62, 95]. The fruit is also used for making preserves, pies etc[183]. The fruit should be used in moderation due to the saponin content[101]. The fruit is produced singly or in clusters, it is up to 9mm long and contains a single seed[229].

tcanta Dye Hedge Hedge Soil stabilization The plants can be grown as a hedge[160] and windbreak[229]. A red dye is obtained from the fruit[57, 106, 257]. Because it has a wide-ranging root system, forms thickets and is wind tolerant, it is sometimes planted for erosion control[229].

dwatta Febrifuge Laxative Stomachic The berries are febrifuge, laxative and stomachic[257]. They have been eaten in the treatment of stomach complaints, constipation and fevers[257].

nrakta Central N. America - Manitoba to New Mexico. ksakta Banks of streams[43] and open wooded areas, often on limestone[101] and on sandy soils[229].

propta Seed - it must not be allowed to dry out[113]. It is best harvested in the autumn and sown immediately in a

old 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, Massing. 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]. A very cold-tolerant plant[229]. Plants rarely produce fruit in Britain[11]. Occasionally cultivated for its edible fruit, there are some named varieties[183]. 'Xanthocarpa' has yellow fruits[200]. The fruit is difficult to harvest because the shrub is very thorny[3]. 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 are required. Special Features:Attractive foliage, North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 6 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.)

4.1.12 *Comptonia peregrina*

Sweet Fern

tfo2n 3 tlin 6 cyuc 3 kcak 3 tcan 3 dwat 1.5 m hkuc hmimhtut cyutli hgatkuyctcup hwicli hyishrasjlut hpa7tli frusflat hpa7tmwatli hjonli

drutta *Comptonia peregrina* is a deciduous Shrub growing to 1.5 m (5ft) by 1 m (3ft 3in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from March to April. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). It can fix Nitrogen. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid 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 and can tolerate drought.

kcakta Edible Parts: Fruit Leaves Edible Uses: Condiment Tea The young fruits are eaten as a pleasant nibble[55, 62, 183]. The aromatic leaves, fresh or dried, are used to make a palatable tea[55, 62, 102, 183]. The leaves are also used as a seasoning[183]. The bristly burr that contains one to four edible nutlets (Peter Alden and Brian Cassie (1999). National Audubon Society Field Guide to the Mid-Atlantic States.)

tcanta Incense Lining Parasiticide Repellent The leaves are used as a lining in baskets etc in order to preserve the fruit[55]. The crushed leaves repel insects[102]. They can be thrown onto a camp fire to keep mosquitoes away[257]. The dried leaves have been burnt as an incense[257].

dwatta Astringer Blood purifier Expectorant Febrifuge Odontalgic Parasiticide Poultice Tonic Sweet fern was employed medicinally by several native North American Indian tribes who used it especially as a poultice to treat a variety of complaints[257]. It is still used for most of the same purposes in modern herbalism. The leaves are astringent, blood purifier, expectorant and tonic[21, 62, 222, 257]. A tea made from the leaves and flowering tops is used as a remedy for diarrhoea, headache, fevers, catarrh, vomiting of blood, rheumatism etc[213, 222, 257]. The infusion has also been used to treat ringworm[257]. The leaves have also been used as a poultice for toothaches, sprains etc[238, 257]. A cold water infusion of the leaves has been used externally to counter the effect of poison ivy[213, 222, 257] and to bathe stings, minor haemorrhages etc[238]. The leaves are harvested in early summer and dried for later use[238].

nakra Eastern N. America - Nova Scotia south to Georgia and east to Minnesota and Tennessee. ksacta Dry, sterile, sandy to rocky soils in pinelands or pine barrens, clearings, pastures or edges of woodlots from sea level to 1800 metres[43, 270].

propta Seed - it has a very tough seed coat and also contains germination inhibitors and so is very difficult to germinate[113]. It is probably best to harvest the seed 'green' (after the seed has fully developed but before it dries on the plant) and sow immediately in a cold frame. If the seed has been stored then soaking in hot water for 24 hours will leach out some of the inhibitors and also help to soften the seed coat. Scarification will also help as will a period of cold stratification. Prick out the seedlings into individual pots as soon as they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out into their permanent positions in late spring or early summer[K]. Root cuttings, 4cm long December in a frame[78, 113]. Plant the root horizontally. High percentage[78]. Suckers removed in the dormant season and potted up or planted into their permanent positions[200]. Plants can be difficult to move successfully[238]. Layering in spring[238].

nwatta Landscape Uses:Arbor, Border, Container, Erosion control, Foundation, Ground cover, Massing, Rock garden, Specimen. Requires a peaty or light loam lime-free soil[11, 182, 200]. Requires an acid well-drained soil of low to medium fertility in partial shade but tolerates full sun if the soil does not dry out in the summer[200]. Tolerates dry sandy soils when grown in the shade[200]. A very ornamental plant[1], it is hardy to at least -25°C[184, 200]. The crushed leaves are very aromatic[182], their scent is most noticeable in the early morning and the evening[238]. The scent increases when the leaves are dried[245]. This species is somewhat intolerant of root disturbance and should be planted out into its permanent position whilst small[238]. Suckering freely[184], this plant is well suited to clothing banks on soils of low fertility[200]. It has 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]. Special Features:North American native, Fragrant foliage, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 3. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A clumping plant, forming a colony from shoots away from the crown but with a limited spread [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.1.13 *Trifolium incarnatum*

Crimson Clover

tfo2n 3 tlin 9 cyuc 2 kcak 4 tcan 0 dwat 0.5 m hkuc htut cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprikliwis hpa7tmwatli fyfixre7t hjonli

drutta *Trifolium incarnatum* is an ANNUAL growing to 0.5 m (1ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to September, and the seeds ripen from July to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

tsakta Edible Parts: Seed Edible Uses: Tea The seeds can be sprouted and eaten in salads[183]. They can also be dried and ground into a nutritious flour[183]. Dried flower heads are a tea substitute[183].

tsakta Green manure Soil reclamation Used as a green manure. It is relatively fast growing, makes an excellent weed suppressing cover and fixes nitrogen[1, 46, 61, 87]. It is also used with grass seed mixes in soil reclamation projects[200].

tsakta Western and southern Europe, including Britain, to the Balkans and the Mediterranean. tsakta Grassy places near the Lizard peninsula in Cornwall[17].

tsakta Pre-soak the seed for 12 hours in warm water and then sow in spring to early summer in situ. The seed can also be sown in early autumn as a winter green manure.

tsakta Succeeds in a moist, well-drained circum-neutral soil in full sun[200]. Succeeds in poor soils. The ssp. molineri is the form of this species that is native to Britain, whilst ssp. incarnatum is naturalized in S. Britain and is the form grown as a green manure crop[17]. It grows well in an apple orchard, the trees will produce tastier fruit that stores better[201]. It should not be grown with camellias or gooseberries because it harbours a mite that can cause fruit drop in the gooseberries and premature budding in the camellias[201]. Fairly resistant to 'clover rot'[87]. 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]. Buttercups growing nearby depress the growth of the nitrogen bacteria by means of a root exudate[201]. When removing plant remains at the end of the growing season, it is best to only remove the aerial parts of the plant, leaving the roots in the ground to decay and release their nitrogen.

4.1.14 *Lathyrus japonicus maritimus*

Beach Pea

tsf2n 3 tlin 7 cyuc 2 kcak 3 tcan 0 dwat m hkuc
htut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

tsakta *Lathyrus japonicus maritimus* is a PERENNIAL growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to August, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, Lepidoptera (Moths and Butterflies). It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate maritime exposure.

tsakta The seed contains a toxic amino-acid which, in large quantities, can cause a very serious disease of the nervous system known as 'lathyrism'. The seed is said to be perfectly safe and very nutritious in small quantities, but should not comprise more than 30% of the diet[65, 76].

tsakta Edible Parts: Leaves Seed Seedpods Edible Uses: Coffee The immature seeds are eaten raw or cooked like peas[183, 257]. Mature seeds are cooked or sprouted and used in salads[183]. A delightful vegetable[172]. A famine food[177]. Very bitter[2, 105, 106]. Some caution is advised, see the notes above on toxicity. Young seedpods - raw or cooked when less than 25mm long[105, 106, 183]. A sweet flavour[106, 172]. Young plant - raw or cooked[161]. Use young shoots that are less than 25cm long[172, 213]. The roasted seed is a coffee substitute[61, 183, 257].

tsakta Nitrogen Fixer.

tsakta Circumpolar, south to Britain, France, Mongolia. tsakta Shingle beaches and sand dunes[17, 187].

tsakta Pre-soak the seed for 24 hours in warm water and then sow in early spring in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. If you have sufficient seed, then it can also be sown in situ in mid spring[200]. Division in spring. It may not transplant well so care should be taken[200].

tsakta An easily grown plant, succeeding in any moderately good garden soil[1]. Prefers a deep moist well-drained soil in a cool position[187]. Prefers a position in full sun, growing well on hot sunny banks[200]. The seed remains

viable for 4 - 5 years in sea water[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]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Growth habit is herbaceous. The plant growth habit is a suckering vine sending up suckers some distance from the main plant [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.1.15 *Lathyrus japonicus*

Beach Pea, Smallflower beach pea

tsf2n 3 tlin 7 cyuc 2 kcak 0 tcan 0 dwat 0.6 m hkuc
htut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

tsakta *Lathyrus japonicus* is a PERENNIAL growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to August, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, Lepidoptera (Moths and Butterflies). It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate maritime exposure.

tsakta The seed contains a toxic amino-acid which, in large quantities, can cause a very serious disease of the nervous system known as 'lathyrism'. The seed is said to be perfectly safe and very nutritious in small quantities, but should not comprise more than 30% of the diet[65, 76].

tsakta Edible Parts: Leaves Edible Uses: Young plant - raw or cooked. An excellent sustenance[207].

tsakta W. and N. Europe, E. Asia - China. N. America. tsakta Sandy coasts from Alaska to N. California[60].

tsakta Pre-soak the seed for 24 hours in warm water and then sow in early spring in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. If you have sufficient seed, then it can also be sown in situ in mid spring[200]. Division in spring. It may not transplant well so care should be taken[200].

tsakta An easily grown plant, succeeding in any moderately good garden soil[1]. It prefers a deep moist well-drained soil in a cool position[187]. Prefers a position in full sun, growing well on hot sunny banks[200]. The seed remains viable for 4 - 5 years in sea water[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].

4.1.16 *Hedysarum vicioides*

tsf2n 3 tlin 7 cyuc 2 kcak 0 tcan 0 dwat 0.7 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

tsakta *Hedysarum vicioides* is a PERENNIAL growing to 0.7 m (2ft 4in). See above for USDA hardiness. It is hardy to UK zone 3. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

tsakta Edible Parts: Root Edible Uses: Root - raw, cooked or dried and ground into a powder[74].

tsakta E. Asia - N. Korea to E. Siberia. tsakta Sandy to gravelly slopes in high mountains or grassy places in lower districts of Japan[58]. River banks in E. Siberia[74]. Forests and subalpine meadows at elevations of 2500 - 3200 metres[266].

tsakta Seed - sow in a cold frame as soon as it is ripe or in the spring[200]. Stored seed should be pre-soaked for 24 hours in warm water. Prick out the seedlings into individual

spots as soon as they are large enough to handle and plant them out into their permanent positions in the summer. Division in spring. Great care is needed since the plant dislikes root disturbance[200].

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

4.2 mran

4.2.1 Tilia x europaea

Linden, Common Lime
3 tlin 9 cyuc 5 kcaak 3 tcan 3 dwat 35 m hkuc
hmimhtut cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprikliw hpa7tmwattli xre7t hjonli

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

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

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

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

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

and is also applied to a powder then applied to burns or sore places[4].

nraakta A hybrid, probably T. cordata. x T. platyphyllos. ksacta Not known in a truly wild situation.

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

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

4.2.2 Tilia cordata

Small Leaved Lime, Littleleaf linden
3 tlin 7 cyuc 5 kcaak 3 tcan 3 dwat 30 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliw hpa7tmwattli xre7t hjonli

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

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

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

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

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

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

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

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

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

4.2.3 Ginkgo biloba

Maidenhair Tree, Ginkgo

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

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

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

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

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

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

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

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

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

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

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

4.2.4 Malus domestica

Apple

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

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

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

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

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

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

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

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

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

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

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

4.2.5 Amelanchier lamarckii

Apple Serviceberry

3 tin 3 cyuc 5 kcaq 0 twan 0 dwat 6 m hkuc hmimhtut cyutli tkac hwocli hrasjlutnyikfrip hpa7tli flatprik hpa7tmwatli fyifxre7t hjonli

drutta *Amelanchier lamarckii* is a deciduous Shrub growing to 6 m (19ft) by 4 m (13ft). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in April, and the seeds ripen from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Edible Uses: Edible fruit - raw or cooked[11]. Sweet and succulent with a flavour of apples[177], they can also be dried for later use[183]. This is one of the nicest fruits in the genus, they can be eaten and enjoyed in quantity[K]. The fruit is rich in iron and copper[226]. It is up to 10mm in diameter[200].

nrakta N. America. Naturalized in Britain. ksacta Possibly no longer found in its original wild habitat, it is naturalized in S. England on sandy heaths and damp acid woods[11, 184].

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nwatta Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not too dry or water-logged[11]. Grows well in heavy clay soils. Prefers an acid or neutral soil. Hardy to about -25°C[184]. This species does not produce suckers[184]. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible ornamentals. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. This species is worthy of special attention because of the quality of its fruit. It was formerly cultivated for these fruits and there are some named varieties[183]. The fruit is freely produced in Britain[184]. Considerable confusion has existed between this species and *A. arborea*, A.

canadensis and A. laevis, see [1] for the latest (1991) classification. Some botanists consider this species to be a natural hybrid *A. canadensis* x *A. laevis*. Hybridizes freely with other members of this genus[200]. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1]. The plant is heat tolerant in zones 9 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.6 *Rosa rugosa*

Ramanas Rose, *Rugosa rose*
 3 tlin 9 cyuc 5 kcaak 3 tcan 2 dwat 2 m hkuc
 hmimhtut cyutli kyuctup hwicli hrasj]lutnyik frip hpa7tli flat-prikrlwis hpa7tmwatli fyfxre7t hjonli

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

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

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

tcanta Hedge Hedge The plant makes a good low hedge[1, 29]. It is very tolerant of maritime exposure, but is very bare in winter[K].

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

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

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

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

4.2.7 *Malva moschata*

Musk Mallow
 3 tlin 10 cyuc 5 kcaak 2 tcan 2 dwat m hkuc
 hmimhtut cyutli tcup hwicli hrasj]lutnyik hpa7tli flat-prikrlwis hpa7tmwatli fyfxre7t hjonli

drutta Malva moschata is a PERENNIAL growing to 0.8 m (2ft 7in) by 0.6 m (2ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil.

Suitable pH: mildly acidic, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

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

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

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

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

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

propta Seed - best sown in early spring in a cold frame. The seed germinates quickly and easily. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in their permanent positions in the early summer[K]. If you have sufficient seed then it can be sown outdoors in situ in the middle to late spring. Basal cuttings in late spring. Harvest the shoots with plenty of underground stem when they are about 8 - 10cm above the ground. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer. Cuttings of side shoots, July/August in a cold frame[111].

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

able. An evergreen. The plant can tolerate a clumper with limited spread [1-2].

4.2.8 *Secale strictum*

Mountain Rye

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

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

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

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

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

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

4.2.9 *Secale strictum kuprijanovii*

3 tlin 7 cyuc 5 kcaak 0 tcan 0 dwat 1.2 m hkuc

htut cyutli hgattcup hwicli hrasjlutnyik hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

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

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

nrakta W. Asia - Caucasia. **ksacta** Mountain meadows[74].

propta Seed - sow March or October in situ and only just cover the seed. Germination should take place within 2 weeks. If the seed is in short supply, it can be grown in pots in the greenhouse or cold frame in early spring. Only just cover the seed. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant them out in late

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

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

4.2.10 *Hemerocallis fulva*

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

3 tlin 10 cyuc 5 kcak 2 tcan 2 dwat 1 m hkuc
hmmihtut cyutli kyuctup hwicli hrasjlutnyikfrip hpa7tli flatprikhlwis hpa7tmwatli dyatxre7t hjonli

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

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

kcakta Edible Parts: Flowers Leaves Root ShootsEdible Uses: Leaves and young shoots - cooked[85, 116, 179, 183]. An asparagus or celery substitute. An excellent sweet tasting vegetable[179, K], though some caution is recommended[127, 137]. The leaves need to be eaten whilst still very young since they quickly become fibrous[K]. Flowers - raw or cooked[62, 100]. The petals are thick and crunchy, making very pleasant eating raw, with a nice sweetness at the base because of the nectar[K]. The flowers can also be dried and used as a thickener in soups etc[62, 183]. In this case, they are picked when somewhat withered and closed[85]. A rich source of iron[218]. Flower buds - raw or cooked[62, 100, 105, 116]. A pea-like flavour[85]. Can be dried and used as a relish[178]. The dried flower contains about 9.3% protein. 25% fat!?, 60% carbohydrate (rich in sugar), 0.9% ash. It is rich in vitamin A[179]. Tubers - raw or cooked[183]. A nutty flavour[62]. Young tubers are best, though the central portion of older tubers is also good[85].

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

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

used as a diuretic[205, 218].

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

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

nwatta Landscape Uses:Border, Erosion control, Ground cover, Massing. Succeeds in most soils[1], including dry ones, though it prefers a rich moist soil[111] and a sunny position but tolerating partial shade[88, 111]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. This species is hardy to about -20°C[187]. Plants take a year or two to become established after being moved[200]. The roots have spindle-shaped swellings and spread freely, the plant can become invasive[205]. A very ornamental plant[1], it is cultivated in China and Japan for its edible flowers and leaves, there are many named varieties[200]. Individual flowers are short-lived, opening in the morning and withering in the evening. The plant, however, produces a succession of flowers over a period of about 6 weeks[205]. The sterile cultivar 'Kwanso' has double flowers, it has been especially mentioned for these flowers which are said to be crunchy with a nutty aftertaste[137]. 'Flore Pleno' is another form with double-flowers that have a delicious taste[K]. The sterile cultivar 'Europa' is very vigorous, with long stolons, and each piece of root is capable of growing into a new plant[205]. This cultivar, which is the form usually supplied from nurseries, succeeds in lawns and has even been known to grow through tarmac[205]. Hybridizes freely with other members of this genus[200]. Many forms of this plant are sterile triploids, probably of garden origin, and do not set seed[205]. The pollen, however, is fertile and can be used to fertilize other plants[205]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. Special Features: Naturalizing, Attracts butterflies, Suitable for cut flowers, Attractive flowers or blooms. The plant is heat tolerant in zones 12 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

4.2.11 *Secale hybrids*

Perennial cereal rye

3 tlin 9 cyuc 5 kcak 4 tcan 1 dwat 1.8 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhlwis hpa7tmwatli hjonli

drutta *Secale hybrids* is a PERENNIAL growing to 1.8 m (6ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Oil SeedEdible Uses: OilCarbon Farming Solutions - Staple Crop: balanced carb (The term

staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1]. A minor or regional perennial crop in production with low or unreported yields [1-1]. Perennial hybrids are now under development. Wild perennial species found in Turkey , for example, *Secale monatum* Guss var. *anatolicum* Boiss and *Secale montanum* Guss var. *vavilovi* Grossh. have a larger stature, high frost resistance, strong tillering ability, and tolerance to poor soils and drought. Understanding wild plant species is becoming important in the development of new hybrid crops.

tcanta OilMany including Biomass; Green manure; Oil; Soil stabilization; and Thatching.

dwatta Possible. For example *Secale cereale* seed is made into a poultice and applied to tumours[218]. The seed is also an effective laxative due to its fibrous seed coat[269].

nrakta Origin: recent hybrid origin. ksacta Hybrid propta Seed. Division.

nwatta Management: Standard Staple Crop; Balanced carb Under DevelopmentClimate: boreal to warm temperate, Mediterranean. Humidity: semi-arid to humid. Carbon Farming Solutions - Cultivation: under development perennial hybrids. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

4.2.12 *Althaea officinalis*

Marsh Mallow, Common marshmallow

3 tlin 7 cyuc 5 kcaak 3 tcan 5 dwat 1.2 m hkuc
htut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flatprikliwshom hpa7tmwatli fyifxre7t hjonli

drutta *Althaea officinalis* is a PERENNIAL growing to 1.2 m (4ft) by 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in saline soils. It cannot grow in the shade. It prefers dry or moist soil.

pcista No documented adverse effects but anecdotal reports allergic reaction and lower blood sugar.

kcaakta Edible Parts: Leaves Oil RootEdible Uses: Egg Oil TeaLeaves - raw or cooked[2, 4, 100]. They are used as a potherb or to thicken soups[62, 183]. When used as a small proportion with other leaves, the taste and texture is acceptable, but if a lot of the leaves are cooked together their mucilaginous texture makes them unpalatable[K]. The leaves can be eaten raw but are rather fibrous and somewhat hairy, though the taste is mild and pleasant[K]. We have found them to be quite acceptable in salads when chopped up finely[K]. Root - raw or cooked[61]. When boiled and then fried with onions it is said to make a palatable dish that is often used in times of shortage[4]. The root is used as a vegetable[62, 141, 183], it is also dried then ground into a powder, made into a paste and roasted to make the sweet 'marshmallow'[4, 5, 7, 17, 61]. The root contains about 37% starch, 11% mucilage, 11% pectin[254]. The water left over from cooking any part of the plant can be used as an egg-white substitute in making meringues etc[62]. The water from the root is the most effective[183], it is concentrated by boiling until it has a similar consistency to egg white. A tea is made from the flowers[183]. A tea can also be made from the root[183].

tcanta Adhesive Fibre Oil TeethThe dried root is used as a toothbrush or is chewed by teething children[6, 7]. It has a mechanical affect on the gums whilst also helping to ease the pain. The root is also used as a cosmetic, helping to soften the skin[7]. A fibre from the stem and roots is used in paper-making[46, 61, 74, 115]. The dried and powdered root has been used to bind the active ingredients when making pills for medicinal use[268]. A glue can be made from the root[74]. The root is boiled in water until a thick syrup is left in the pan, this syrup is used as a glue. An oil from the seed is used in making paints and varnishes[74].

dwatta Antidiarrhoeal Antitussive Demulcent Diuretic Emollient Laxative Odontalgic UrinaryMarsh mallow is a very useful household medicinal herb. Its soothing demulcent properties make it very effective in treating inflammations and irritations of the mucous membranes such as the

alimentary canal, the urinary and the respiratory organs[4, 254]. The root counters excess stomach acid, peptic ulceration and gastritis[254]. It is also applied externally to bruises, sprains, aching muscles, insect bites, skin inflammations, splinters etc[4, 238]. The whole plant, but especially the root, is antitussive, demulcent, diuretic, highly emollient, slightly laxative and odontalgic[4, 17, 21, 46, 165]. An infusion of the leaves is used to treat cystitis and frequent urination[254]. The leaves are harvested in August when the plant is just coming into flower and can be dried for later use[4]. The root can be used in an ointment for treating boils and abscesses[254]. The root is best harvested in the autumn, preferably from 2 year old plants, and is dried for later use[238]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Althaea officinalis* Marsh Mallow for irritation of mouth and throat and associated dry cough/bronchitis (Root and leaf), mild stomach lining inflammation (root) (see [302] for critics of commission E).

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

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

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

4.2.13 *Lepidium* spp.

Perennial Lepidium

3 tlin 10 cyuc 5 kcaak 0 tcan 3 dwat 1.2 m hkuc
hmimtmu cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliwshom hpa7tmwatli hjonli

drutta *Lepidium* spp. is a PERENNIAL growing to 1.2 m (4ft) by 2 m (6ft 7in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcaakta Edible Parts: Leaves RootEdible Uses: Carbon Farming Solutions - Staple Crop: oil (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1]. Fruit is usually spreading and squat (less than 3 times as long as broad).

tcanta See individual species.

dwatta Various medicinal qualities depending on the species.

nrakta Origin: N. Temperate. Widely distributed in the Americas, Africa, Asia, Europe, and Australia. ksacta Various

depending on the species.

propta See individual species.
nwatta Management: Standard Staple Crop: Oil Under DevelopmentClimate: boreal to warm temperate. Humidity: semi-arid to humid. A genus of plants in the mustard/cabbage family, Brassicaceae. Annual to perennial, herbs or shrubs. Species include garden cress, maca, and dittander. Lepidium is from the Greek lepis (scale) referring to the shape of the seed pods. Carbon Farming Solutions - Cultivation: under development. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

4.2.14 *Urtica dioica*

Stinging Nettle, California nettle

3 tlin 10 cyuc 5 kcaak 4 tcan 5 dwat 1.2 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis
hpa7tmwlati nyanhjen hjonli

drutta *Urtica dioica* is a PERENNIAL growing to 1.2 m (4ft) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in leaf from March to November, in flower from May to October, and the seeds ripen from June to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Wind. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

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

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

tcanta Biomass Compost Dye Fibre Hair Liquid feed Oil Repellent WaterproofingA strong flax-like fibre is obtained from the stems[200]. Used for making string and cloth[1, 4, 6, 13, 36], it also makes a good quality paper[115]. It is harvested as the plant begins to die down in early autumn and is retted before the fibres are extracted[4, 99]. The fibre is produced in less abundance than from flax (*Linum usitatissimum*) and is also more difficult to extract[4]. The plant matter left over after the fibres have been extracted are a good source of biomass and have been used in the manufacture of sugar, starch, protein and ethyl alcohol[4]. An oil obtained from the seeds is used as an illuminant[4]. An essential ingredient of 'QR' herbal compost activator[32]. This is a dried and powdered mixture of several herbs that can be added to a compost heap in order to speed up bacterial activity and thus shorten the time needed to make the compost[K]. The leaves are also an excellent addition to the compost heap[12, 18, 20]

and they can be soaked for 7 - 21 days in water to make a very nutritious liquid feed for plants[54]. This liquid feed is both insect repellent and a good foliar feed[14, 18, 53]. The growing plant increases the essential oil content of other nearby plants, thus making them more resistant to insect pests[18, 20, 54]. Although many different species of insects feed on nettles, flies are repelled by the plant so a bunch of freshly cut stems has been used as a repellent in food cupboards[4]. The juice of the plant, or a decoction formed by boiling the herb in a strong solution of salt, will curdle milks and thus acts as a rennet substitute[4]. This same juice, if rubbed into small seams of leaky wooden tubs, will coagulate and make the tub watertight again[4]. A hair wash is made from the infused leaves and this is used as a tonic and antidandruff treatment[172, 201]. A beautiful and permanent green dye is obtained from a decoction of the leaves and stems[115]. A yellow dye is obtained from the root when boiled with alum[4, 115]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

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

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

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

nwatta Industrial Crop: Fiber Management: Hay Regional Crop Staple Crop: ProteinPrefers a soil rich in phosphates and nitrogen. Plants must be grown in a deep rich soil if good quality fibre is required[4, 115]. Nettles are one of the most undervalued of economic plants. They have a wide range of uses, for food, medicines, fibres etc and are also a very important plant for wildlife. There are at least 30 species of insects that feed on it and the caterpillars of several lepidoptera species are dependant upon it for food[30].

Especially when growing in rich soils, the plant can spread vigorously and is very difficult to eradicate. It is said that cutting the plant down three times a year for three years will kill it[4]. It is a good companion plant to grow in the orchard and amongst soft fruit[53, 54]. So long as it is not allowed to totally over-run the plants, it seems to improve the health of soft fruit that grows nearby and also to protect the fruit from birds, but it makes harvesting very difficult. Dioecious. Male and female plants must be grown if seed is required. The plant is heat tolerant in zones 10 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.15 *Foeniculum vulgare*

Fennel, Sweet fennel

3 tlin 10 cyuc 5 kcaak 4 tcan 3 dwat 1.5 m hkuc
htut cyutli hgatkyuctcup hwicli hrasjlutnyik hpa7tli flatprikl-
wis hpa7mwtatli fyfjre7t hjonli

drutta *Foeniculum vulgare* is an evergreen Perennial growing to 1.5 m (5ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf all year, in flower from August to October, and the seeds ripen from September to October. The species is 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 prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

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

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

tcanta Dye Essential Oil Repellent StrewingThe seed yields up to 5% of an essential oil[1, 4, 46]. This is used medicinally, as a food flavouring, in toothpastes, soaps, perfumery, air fresheners etc[1, 46, 238]. The flavour of fennel oil depends upon its two main constituents. 'Fenchone' is a bitter tasting element whilst 'anethole' has a sweet anise-

like flavour[238]. The proportions of these two ingredients varies according to strain and region. Plants growing in the Mediterranean and southern Europe usually have a sweet oil whilst plants growing in central and northern Europe usually produce a more bitter oil[238]. The quality of the oil also depends upon how well the seed has been dried - the oil from fully ripened and dried seeds being much sweeter and more fragrant[245]. The dried plant is an insect repellent[14, 53], the crushed leaves are effective for keeping dogs free of fleas[201]. The plant was formerly used as a strewing herb[201]. Yellow and brown dyes are obtained from the flowers and leaves combined[168].

dwatta Analgesic Antinflammatory Antispasmodic Aromatherapy Aromatic Carminative Diuretic Emmenagogue Expectorant Galactagogue Hallucinogenic Stimulant Stomachic UrinaryFennel has a long history of herbal use and is a commonly used household remedy, being useful in the treatment of a variety of complaints, especially those of the digestive system[244]. The seeds, leaves and roots can be used, but the seeds are most active medicinally and are the part normally used[4]. An essential oil is often extracted from the fully ripened and dried seed for medicinal use, though it should not be given to pregnant women[4, 238]. The plant is analgesic, anti-inflammatory, antispasmodic, aromatic, carminative, diuretic, emmenagogue, expectorant, galactagogue, hallucinogenic, laxative, stimulant and stomachic[4, 7, 9, 21, 147, 165, 176, 192, 238]. An infusion is used in the treatment of indigestion, abdominal distension, stomach pains etc[254]. It helps in the treatment of kidney stones and, when combined with a urinary disinfectant like *Arcostaphylos uva-ursi*, makes an effective treatment for cystitis[254]. It can also be used as a gargle for sore throats and as an eyewash for sore eyes and conjunctivitis[254]. Fennel is often added to purgatives in order to allay their tendency to cause gripe, and also to improve the flavour[4]. An infusion of the seeds is a safe and effective cure for wind in babies[244]. An infusion of the root is used to treat urinary disorders[238]. An essential oil obtained from the seed is used in aromatherapy. Its keyword is 'Normalising'[210]. The essential oil is bactericidal, carminative and stimulant[218]. Some caution is advised, see notes above on toxicity[222]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Foeniculum vulgare* for cough, bronchitis, dyspeptic complaints (see [302] for critics of commission E).

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

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

nwatta An easily grown plant, it succeeds in most soils but prefers a sunny dry position[4, 16, 37, 200]. It grows well in sandy soils[188] and is drought tolerant once established[190]. Plants often self-sow freely in the garden[K]. Plants can be grown in quite coarse grass, which can be cut annually in the autumn[233]. Although hardy in most parts of Britain, plants are liable to die out over the winter if the soil is not well-drained or the weather is persistently cold and wet[238]. Fennel is often cultivated in the herb garden for its edible and medicinal uses, there are some named varieties[183]. Especially in mild winters, the leaves can be available all year round[K]. It is best to cut a few plants back to ground level occasionally during the growing season, thus ensuring a constant supply of fresh young shoots[4]. In a dry summer make sure that you water the cut-down clump or it might not regrow that year[K]. Fennel is also grown commercially as a medicinal plant and for its essential oil[4, 238]. Fennel is in general a poor companion plant in the garden. It inhibits the growth of nearby plants, especially beans, tomatoes and kohlrabi[14, 18]. It is itself inhibited by wormwood and coriander[14, 18]. However, the flowering plant attracts beneficial insects such as bees, parasitic wasps, tachinid flies and hoverflies to the garden. The presence of these creatures will help to maintain a natural balance of insects in the garden and help prevent infestations by aphids etc[238]. It is best not to grow fennel and dill (*Anethum graveolens*) close to each other since hybridisation can occur and the re-

seedling seedlings will be of indeterminate flavour[238]. The plant is heat tolerant in zones 9 through 6. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2].

4.2.16 *Rumex acetosa*

Sorrel, Garden sorrel

3 tlin 7 cyuc 5 kcaak 4 tcan 3 dwat 0.6 m hkuc
hmimhtut cyutli tcup hwicli hrsajlutnykrip hpa 7tli frusflatprik-
wis hpa7tmwatli nyanhjen hjonli

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

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

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

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

dwatta Anthelmintic Antiscorbutic Astringent Depurative Diuretic Febrifuge Homeopathy Laxative Refrigerant Stomachic The fresh or dried leaves are astringent, diuretic, laxative and refrigerant[4, 7, 14, 21, 238]. They are used to make a cooling drink in the treatment of fevers and are especially useful in the treatment of scurvy[4]. The leaf juice,

mixed with fumitory, has been used as a cure for itchy skin and ringworm[4]. An infusion of the root is astringent, diuretic and haemostatic[4, 7, 14, 21, 218]. It has been used in the treatment of jaundice, gravel and kidney stones[4]. Both the roots and the seeds have been used to stem haemorrhages[4]. A paste of the root is applied to set dislocated bones[272]. The plant is depurative and stomachic[7, 14, 21, 218]. A homeopathic remedy is made from the plant[9]. It is used in the treatment of spasms and skin ailments[9].

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

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

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

4.2.17 *Camassia quamash*

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

3 tlin 7 cyuc 5 kcaak 3 tcan 1 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hrsajlutnykrip hpa 7tli flatprik-
wis hpa7tmwatli xre7t hjonli

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

ksakta Edible Parts: RootEdible Uses: Bulb - raw or cooked[62, 95]. The bulb, which can be up to 5cm in diameter[270], has a mild, starchy flavour when eaten raw, but a gummy texture that reduces the enjoyment of it somewhat[K]. When cooked, however, it develops a delicious sweet flavour somewhat like sweet chestnuts[92], and is a highly nutritious food[2]. Excellent when slow baked, it can also be dried and made into a powder which can be used as a thickener in stews or mixed with cereal flours when making bread, cakes etc[K]. The bulbs can be boiled down to make a molasses, this was used on festival occasions by various Indian tribes[2, 183]. The bulbs can be harvested at any time of the year[85], but are probably best in early summer when the seeds are ripe[94]. One report says that the bulbs contain inulin (a starch that cannot be digested by humans) but that this breaks down when the bulb is cooked slowly to form the sugar fructose which is sweet and easily digested[256]. Quamash bulbs were a staple food of the N. American Indians[42, 92]. The tribes would move to the Quamash fields in the early autumn and, whilst some people harvested the bulbs, others would dig a pit, line it with boulders then fill it with wood and set fire to it. The fire would heat the boulders and the harvested bulbs would then be placed in the pit and the whole thing covered with earth and the bulbs left to cook slowly for 2 days. The pit would then be opened and the Indians would feast on the bulbs until they could no longer fit any more in their stomachs. Whatever was left would be dried and stored for winter use.

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

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

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

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

nwatta Succeeds in almost any soil[42]. Grows well in heavy clay soils. Prefers a rather heavy loam[1] that has plenty of moisture in spring but does not remain wet over the winter[138, 200]. Dislikes dry soils[200]. Prefers full sun but tolerates partial shade[138, 200]. The dormant bulbs are very hardy and will withstand soil temperatures down to at least -10°C[214]. Quamash is a very pretty flowering bulb that has quite a large potential as an edible ornamental plant[K]. It grows very well in the flower border but can also be naturalised in damp grass[134]. We are intending to grow it in a grassed-down orchard in our Cornish trial ground. The bulbs flower in late spring and early summer and have completely died down by early July so they do not interfere with harvesting the apple crop. The grass in the orchard will be cut in early spring before the quamash comes into growth, but will not be cut again until July. The bulbs will be harvested at any time from July to December and, since it is impossible to find all the bulbs, it is hoped that those remaining will be able to increase and supply bulbs for future years[K]. A polymorphic and very ornamental plant[1], there are some named varieties[200]. The subspecies *C. quamash maxima* has larger bulbs than the type, up to 65mm in diameter[270]. A good bee plant[108]. This species can be confused with certain poisonous bulbs in the genus *Zigadenus*[85]. Plant the bulbs 7 - 10cm deep in early autumn and then leave undisturbed[1]. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over

86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is a bulb.

4.2.18 *Prunus besseyi*

Western Sand Cherry

3 tlin 6 cyuc 4 kcak 2 tcan 1 dwat 1.2 m hkuc hmimhtut cyutli hgattcup hwicli hrasjlutnyk hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

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

nwatta Landscape Uses:Specimen. Thrives in a well-drained moisture-retentive loamy soil, doing well on limestone[11, 200]. Prefers some lime in the soil but is likely

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

4.2.19 Cichorium intybus

Chicory Radicchio, Succory, Witloof
3 tlin 7 cyuc 4 kcaak 3 tcan 3 dwat 1.5 m hku
htut cyutli tcup hwicli hrasljutnyik hpa7tli fruslatprikhwisslip
hpa7tmwatli fyfxkre7t hjonli

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

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

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

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

and storing them in a more bioavailable form - as used as fertilizer or to improve mulch. Nectary, Insect shelter.

dwatta Appetizer Bach Cardiac Cholagogue Depurative Digestive Diuretic Hypoglycaemic Laxative Tonic Warts Chicory has a long history of herbal use and is especially of great value for its tonic affect upon the liver and digestive tract[254]. It is little used in modern herbalism, though it is often used as part of the diet. The root and the leaves are appetizer, cholagogue, depurative, digestive, diuretic, hypoglycaemic, laxative and tonic[4, 7, 9, 13, 21, 46, 222]. The roots are more active medicinally[222]. A decoction of the root has proved to be of benefit in the treatment of jaundice, liver enlargement, gout and rheumatism[4]. A decoction of the freshly harvested plant is used for treating gravel[4]. The root can be used fresh or dried, it is best harvested in the autumn[9]. The leaves are harvested as the plant comes into flower and can also be dried for later use[9]. The root extracts have experimentally produced a slower and weaker heart rate (pulse)[222]. The plant merits research for use in heart irregularities[222]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Possessiveness', 'Self-love' and 'Self-pity'[209]. The latex in the stems is applied to warts in order to destroy them[218]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve Cichorium intybus for loss of appetite, dyspepsia (see [302] for critics of commission E).

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

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

nwatta Prefers a sunny position in any moderately fertile well-drained moisture retentive soil[1, 14, 52]. Prefers a pH 5.5 to 7[200]. Tolerates a pH in the range 4.5 to 8.3. Chicory grows on any type of soil but, when cultivated, grows best on mellow, deeply tilled, fertile soil or sandy loam[269]. A cool weather crop, it tolerates only moderate summer temperatures and requires well-distributed rainfall, with good drainage, or some irrigation in drier areas[269]. Chicory roots deeply in relatively short time; soil too wet for beans and small grains is not suitable[269]. To insure proper root-growth, apply lime or marl to acid soil to neutralize acidity[269]. Chicory is reported to tolerate a pH in the range of 4.5 to 8.3, an annual rainfall of 30 to 400 cm and an annual mean biotemperature of 6° to 27°C[269]. Chicory is an excellent winter salad. It is often cultivated, especially in Europe, for its edible leaves and for its roots which are used to make a coffee substitute. There are many named varieties[46, 132, 183] and, by careful selection of cultivars and sowing times, fresh leaves can be obtained all year round. There are three main types of chicory grown for their leaves, there are many cultivars of each form: A bitter-tasting loose-leaved form is grown as a green winter vegetable, especially in southern Italy. A narrow-leaved, witloof or Belgian form has a compact elongate head (chicon) which is blanched for use in salads or cooked dishes. A broad-leaved (usually red) form produces cabbage-like hearts, these are generally less bitter than the other forms and are eaten raw or cooked. These forms are often used as a winter salad crop[K]. Although a perennial, chicory is usually cultivated as an annual crop, especially when being grown as a winter salad. The winter salad cultivars are usually sown in early summer to make sure that they do not flower in their first year of growth. By late autumn they have formed an overwintering rosette of leaves rather like a cabbage. These leaves can be harvested as required during the winter and the plants will then usually make some new growth (as long as the winter is not too cold) that can be harvested in late winter or early spring. The plants run to flower in the following summer and fail to make an overwintering rosette of leaves for that winter[K]. Chicory can be grown successfully in a meadow or even in a lawn so long as the grass is not cut too short nor too often[K]. It often self-sows freely when well-sited, especially if it is growing in a dry alkaline soil[238]. A good bee plant[24, 108]. A very ornamental plant[1]. The flowers open in the early morning (about 6 - 7 o'clock in Britain) and close around midday[4]. Special Features: Edible, Not North American native, Invasive, Naturalizing. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show

well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

4.2.20 *Lonicera caerulea*

Sweetberry honeysuckle, Bluefly honeysuckle, Haskap berry
3 tlin 8 cyuc 4 kcaok 0 tcan 0 dwat 2 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli dyatxre7t hjonli

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

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

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

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

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

4.2.21 *Rheum × hybridum*

Garden Rhubarb

3 tlin 8 cyuc 4 kcaok 1 tcan 3 dwat 1.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli hjonli

drutta *Rheum × hybridum* is a deciduous Perennial growing to 1.5 m (5ft) by 1.5 m (5ft) at a medium rate.

See above for USDA hardiness. It is hardy to UK zone 4. The flowers are pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It cannot tolerate atmospheric pollution.

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

kcakta Leaf stem - raw or cooked[1, 2, 46, 105, 200]. An acid taste, it is used as a fruit substitute in spring, usually stewed with sugar and used in pies, jams etc[183]. The juice strained from stewed rhubarb can add colour and flavour to a fruit punch[183]. It is best not to eat large quantities of the stems because of their oxalic acid content - see the notes above on toxicity. Immature flowers - cooked and used like cauliflower[183]. One report says that the plant contains 0.7% rutin[240]. It does not specify which part of the plant, though it is likely to be the leaves[K].

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

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

nrakta Cosmopolitan ksacta Garden Hybrid

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

nwatta *R. hybridum* is an herbaceous perennial plant. A very easily grown plant, tolerant of considerable neglect, it prefers a deep, fertile, moderately heavy, humus rich, moisture retentive, well-drained soil in sun or semi-shade[200, 264]. It succeeds in most soils provided the drainage is good[200] and will grow in the dappled shade of trees so long as there is sufficient side light[K]. It grows well in heavy clay soils. Tolerates acid conditions but prefers a pH in the range 6.5 to 7[200]. Plants are very cold hardy, tolerating temperatures down to at least -20°C[200]. The plant does

like hot summers, however, and is likely to die in warmer climates[264]. Rhubarb is a long-lived and almost indestructible perennial plant[264]. It is often cultivated for its edible leaf stems, there are many named varieties[74, 183]. Most cultivars produce edible stems from spring to early summer, though 'Glaskin's Perpetual' can be harvested throughout the summer. By digging up the roots in the autumn and exposing them to frost, earlier growth will be initiated. These roots can then be transferred to a cold frame or other protected area where they will produce their edible stems in late winter. It is also possible to produce earlier crops outdoors by covering the plants with a layer of straw and an upturned bucket. This species is probably of hybrid origin, *R. rhaponticum* x *R. palmatum*[200]. It hybridizes freely with other members of the genus[200]. Plants in this genus seem to be immune to the predations of rabbits[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

4.2.22 *Camassia leichtlinii*

Wild Hyacinth, Large camas, Suksdorf's large camas
 3 tlin 7 cyuc 4 kcaok 0 tcan 0 dwat 1 m hkuc
 hmimhtut cyutli tcup hwicli hrasjlutnykfrif hpa7tli flatprik-
 wis hpa7tmwatwilex7t hjonli

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

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

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

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

nwatta A very easily grown plant, it succeeds in almost any soil[42] and is tolerant of considerable neglect once it is established[K]. Grows well in heavy clay soils. Prefers a rather heavy loam[1] that has plenty of moisture in spring but does not remain wet over the winter[138, 200]. Dislikes dry soils[200]. Prefers full sun but tolerates partial shade[138, 200]. A very ornamental plant[1], there are many named varieties[200]. Plants often self-sow[K]. A good bee plant[108]. Plants can be naturalized in damp grass, this should not be trimmed until mid to late summer when the bulbs have flowered and the leaves have died down[134]. This species can

be confused with certain poisonous bulbs in the genus *Zigadenus*[85]. Plant the bulbs 7 - 10cm deep in early autumn and then leave undisturbed[1]. The bulbs should be planted about 20cm deep[233]. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is a bulb.

4.2.23 *Pinus cembra*

Swiss Stone Pine, Swiss Pine, Arolla Pine
 3 tlin 9 cyuc 4 kcaok 3 tcan 2 dwat 15 m hkuc
 hmimhtut cyutli hpatgyuctcup hwicli hyishrasjlutnykfrif
 hpa7tli flatprik hpa7tmwatwili dyat hjonli

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

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

kcakta Edible Parts: Oil SeedEdible Uses: Condiment OilSeed - raw or cooked[1, 2, 4, 34, 177, 183]. Much valued as a food, the oil-rich seed has a delicious flavour but with a slight flavour of turpentine. A reasonable size, it is about 10mm x 8 mm[200]. An edible drying oil is obtained from the seed[2, 57, 63, 183]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulp-wood[200].

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

dwatta The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge[4]. It is a valuable remedy used internally in the treatment of kidney and bladder complaints and is used both internally and as a rub and steam bath in the treatment of rheumatic affections[4]. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and TB[4]. Externally it is a very beneficial treatment

of a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers[4].

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

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

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

4.2.24 *Amaranthus hypochondriacus*

Prince's Feather, Prince-of-wales feather
3 tlin 10 cyuc 4 kcak 2 tcan 3 dwat 1.2 m hkuc
htut cyutli tcup hwicli hrasjltunyk hpa7tli flatprikwis
hpa7tmwatli fyif hjonli
drutta *Amaranthus hypochondriacus* is a ANNUAL/PERENNIAL growing to 1.2 m (4ft) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is frost tender. It is in leaf from April to October, in flower from July to August, and the seeds ripen from August to September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant

is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

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

kcakta **Edible Parts:** Leaves **Seed****Edible Uses:** Colouring **Young leaves** - cooked as a spinach[183, 238]. Rich in vitamins and minerals, they have a mild flavour[K]. Seed - raw or cooked. They can be used as a cereal substitute. They can also be popped in much the same way as popcorn[183]. The seed can be soaked for 12 hours in warm water and then allowed to sprout for about 11 days[244]. They can then be added to salads[183]. Very small but the seed is easy to harvest and very nutritious. The seed can be cooked whole, and becomes very gelatinous like this, but it is rather difficult to crush all of the small seeds in the mouth and thus some of the seed will pass right through the digestive system without being assimilated[K]. A red pigment obtained from the plant is used as a food colouring[238].

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

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

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

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

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

4.2.25 *Sambucus nigra* spp *canadensis*

American Elder
3 tlin 9 cyuc 4 kcak 3 tcan 3 dwat 4 m hkuc
hmimhtut cyutli tcup hwicli hrasjltunykfrip hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

drutta *Sambucus nigra* spp *canadensis* is a deciduous Shrub growing to 4 m (13ft) by 4 m (13ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in July, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium

and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

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

kcakta Edible Parts: Flowers Fruit Shoots Edible Uses: Drink Tea Fruit - raw or cooked[2, 3, 55, 85, 257]. A bitersweet flavour, the fruits are about 5mm in diameter and are borne in large clusters[200, 227]. They are at their best after being dried[62], the fresh raw fruit has a rather rank taste[101]. The fruit is normally cooked and used in pies, jams, jellies, sauces, bread etc[62, 159, 183]. Rich in vitamin C[183]. Some caution is advised, see notes above on toxicity. Flowers - raw or cooked. They are often covered in batter and made into fritters[105]. The flowers can be picked when unopened, pickled and then used as a flavouring in candies etc[149, 227]. They can also be soaked in water to make a drink[149]. A pleasant tasting tea is made from the dried flowers[21, 159, 183, 257]. Young shoots are said to be edible when cooked and to be used as an asparagus substitute[55, 105] though, since the leaves are also said to be poisonous, this report should be viewed with some doubt.

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

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

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

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame, when it should germinate in early spring. Stored seed can be sown in the spring in a cold frame but will probably germinate better if it is given 2 months warm followed by 2 months cold stratification first[78, 98, 113]. Prick out the seedlings into individual pots when they

are large enough to handle. If good growth is made, the young plants can be placed in their permanent positions during the early summer. Otherwise, either put them in a sheltered nursery bed, or keep them in their pots in a sheltered position and plant them out in spring of the following year. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame[78]. Cuttings of mature wood of the current season's growth, 15 - 20cm with a heel, late autumn in a frame or a sheltered outdoor bed[78]. Division of suckers in the dormant season.

nwatta Agroforestry Services: Contour hedgerow Industrial Crop: Dye Industrial Crop: Medicinal Management: Standard Regional Crop Tolerates most soils, including chalk[200], but prefers a moist loamy soil[11, 200]. Grows well in heavy clay soils. Tolerates some shade but is best in a sunny position[1]. Tolerates atmospheric pollution and coastal situations[200]. A very hardy plant, when dormant it tolerates temperatures down to about -34°C[200]. The flowers have a muscatel smell[245]. A fast-growing but short-lived plant[229], it often forms thickets by means of root suckers[200]. It is occasionally cultivated for its edible fruit, there are several named varieties[183], though these have mainly been developed for their ornamental value[182]. Yields of up to 7kg of fruit per tree have been recorded[160]. Plants in this genus are notably resistant to honey fungus[200]. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.26 *Prunus armeniaca mandschurica*

Manchurian apricot

3 tlin 9 cyuc 4 kcak 3 tcant 3 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasljut hpa7tli flatprikliwis
hpa7tmwatli fyif hjonli

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

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

kcakta Edible Parts: Fruit Oil Seed Edible Uses: Gum Oil Edible Portion: Fruit, Seeds. Fruit - raw, cooked or dried for later use[1, 2, 3, 34]. The best forms are soft and juicy with a delicious rich flavour[K]. Wild trees in the Himalayas yield about 47.5kg of fruit per year[194]. The fruit of the wild form contains about 6.3% sugars, 0.7% protein, 2.5% ash, 2.5% pectin. There is about 10mg vitamin C per 100g of pulp[194]. The fruit is about 5cm in diameter and contains one large seed[200]. Seed - raw or cooked[183]. Bitter seeds

should be eaten in strict moderation, but sweet ones can be eaten freely[132]. The bitter seeds can be used as a substitute for bitter almonds in making marzipan etc[4]. An edible gum is obtained from the trunk[64]. The seed contains up to 50% of an edible semi-drying oil[4, 57, 61, 183]. Carbon Farming - Staple Crop: oil.

tcanta Cosmetic Dye Gum Oil WoodAn edible semi-drying oil is obtained from the seed[57]. Used for lighting[194]. The oil has a softening effect on the skin and so it is used in perfumery and cosmetics, and also in pharmaceuticals[4, 61]. A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Wood - handsome, hard, durable. Agricultural implements etc[146, 194]. Carbon Farming - Industrial Crop: oil. Espalier: tree or other plants that is trained to grow flat against a support (such as a trellis or wall).

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

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

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

nwatta Industrial Crop: Oil Management: Standard Regional Crop Staple Crop: OilClimate: boreal to warm temperate. Humidity: semi-arid to humid. Landscape Uses:Specimen. Requires a well-drained moisture retentive fertile soil in a warm sunny position[11, 200]. Succeeds in light shade but fruits better in a sunny position[200]. Thrives in a loamy soil, doing well on limestone[11]. Prefers some chalk in the soil but is apt to become chlorotic if too much is present[11]. Prefers a pH in the range 6.5 to 7.5[200]. Dislikes clay soils[37, 61]. Intolerant of saline soils[200]. Trees drop their fruit buds if there is a summer drought[200]. The apricot is widely cultivated for its edible fruit in temperate areas that have long hot summers, there are many named varieties[183, 200]. The tree is perfectly hardy in Britain but it usually flowers very early in the spring and the flowers are then liable to be destroyed by frosts[11]. It really requires

a more continental climate (with its clearly defined seasons) than it gets in Britain. However, if given the benefit of a south or west facing wall and some protection from frosts when it is in flower, reasonable crops can usually be produced in southern England[1, 219]. The plants are self-fertile[200], but hand pollination would be advisable since they are normally flowering before many pollinating insects are active. In Britain apricots are usually grown on plum rootstocks, 'St. Julien A' is the most widely used[200]. The dwarfing rootstock 'Pixie' is also a possibility, but this must be double worked with 'St. Julien A' because it is incompatible with apricots[200]. Any pruning should be carried out in the summer to allow rapid healing and therefore less risk of infection[201]. Oats should not be grown near apricots because their roots have an antagonistic effect on the roots of the apricot[201]. Tomatoes and potatoes are also bad companions for apricots[201]. If nasturtiums (*Tropaeolum* spp) are grown under apricots they will make the fruit less palatable to insects, though this is not detectable by the human palate[201]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Edible, Not North American native, Fragrant flowers, Attractive flowers or blooms. Carbon Farming - Cultivation: regional crop only. Management: standard. Espalier.

4.2.27 *Portulaca oleracea*

Green Purslane, Little hogweed

3 tin 12 cyuc 4 kcaak 2 tcan 3 dwt 0.3 m hkuc
htut cyutli tcup hwicli hrasjlut hpa7tli flatprikliwis
hpa7tmwatli fyfuxre7t hjonli

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

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

dwatta Antiscorbutic Depurative Diuretic Febrifuge Skin Tonic VermifugeThe plant is antibacterial, antiscorbutic, depurative, diuretic and febrifuge[4, 7, 147, 152, 238]. The leaves are a rich source of omega-3 fatty acids, which is thought to be important in preventing heart attacks and strengthening the immune system[238]. Seed sources such

watals, however, are much richer sources[222]. The fresh juice is used in the treatment of strangury, coughs, sores etc[4, 7, 147, 152]. The leaves are poulticed and applied to burns[222], both they and the plant juice are particularly effective in the treatment of skin diseases and insect stings[7, 238]. A tea made from the leaves is used in the treatment of stomach aches and headaches[222]. The leaf juice is applied to earaches, it is also said to alleviate caterpillar stings[222]. The leaves can be harvested at any time before the plant flowers, they are used fresh or dried[238]. This remedy is not given to pregnant women or to patients with digestive problems[238]. The seeds are tonic and vermifuge[218, 240]. They are prescribed for dyspepsia and opacities of the cornea[218].

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

propta Seed - for an early crop, the seed is best sown under protection in early spring and can then be planted out in late spring[4]. Outdoor sowings in situ take place from late spring to late summer, successional sowings being made every two to three weeks if a constant supply of the leaves is required[4].

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

4.2.28 Gaultheria procumbens

Checkerberry, Eastern teaberry, Teaberry, Creeping Wintergreen

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

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

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

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

tcanta Essential An essential oil is obtained from the leaves by steam distillation[2, 14, 57, 213]. In order to obtain the oil, the leaves need to be steeped for 12 - 24 hours in water[4]. The essential oil is used as a food flavouring, medicinally (the original source of Wintergreen oil used as a liniment for aching muscles) and in perfumery and toothpastes. In large doses it can be toxic[165, 244]. A good ground-cover

plant for shady positions though it requires weeding for the first year or so[28, 31, 197]. Forming a dense tuft-like carpet, it roots as it spreads and should be spaced about 45cm apart each way[208]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Analgesic Antiinflammatory Antirheumatic Aromatic Astringent Carminative Diuretic Emmenagogue Stimulant Tonic Checkerberry leaves were widely used by the native North American Indians in the treatment of aches and pains and to help breathing whilst hunting or carrying heavy loads[238]. An essential oil (known as 'oil of wintergreen') obtained from the leaves contains methyl salicylate, which is closely related to aspirin and is an effective anti-inflammatory[213]. This species was at one time a major source of methyl salicylate, though this is now mainly synthesized[238]. The leaves, and the oil, are analgesic, anti-inflammatory, aromatic, astringent, carminative, diuretic, emmenagogue, stimulant and tonic[4, 21, 165]. An infusion of the leaves is used to relieve flatulence and colic[254]. The plant, especially in the form of the essential oil, is most useful when applied externally in the treatment of acute cases of rheumatism, sciatica, myalgia, sprains, neuralgia and catarrh[4, 238]. The oil is sometimes used in the treatment of cellulitis, a bacterial infection that causes the skin to become inflamed[254]. Some caution is advised, especially if the oil is used internally, since essential oil is toxic in excess, causing liver and kidney damage[4, 238]. It should not be prescribed for patients who are hypersensitive to salicylates (aspirin)[238]. The leaves can be gathered at any time from spring to early autumn, they are dried for use in infusions or distilled to produce the oil[238].

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

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

nwatta Landscape Uses: Ground cover, Massing, Rock garden, Woodland garden. Prefers a moist but not boggy humus rich soil in shade or semi-shade[11, 182]. A peat and moisture loving species, it requires a lime-free soil[11, 182]. Succeeds in dry soils once it is well established and tolerates considerable drought[208]. Grows well under the thin shade of deciduous shrubs or evergreens[4, 11]. A very cold-hardy plant, tolerating temperatures down to about -35°C[160]. Plants can become invasive when growing in good conditions[182]. Some named forms have been developed for their ornamental value, 'Dart's Red Giant' has specially large berries[182]. All parts of the plant are aromatic, the bruised leaves having the scent of wintergreen[245]. Plants in this genus are notably resistant to honey fungus[200]. Special Features: North American native, Fragrant foliage, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from

1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. A clumping mat former. Forming a dense prostrate carpet spreading indefinitely [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

4.2.29 *Malus prunifolia*

Chinese Apple, Plumleaf crab apple

3 tlin 7 cyuc 4 kcak 0 tcen 0 dwat 8 m hkuc
hmmihtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flat-prikliwis hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

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

4.2.30 *Carum carvi*

Caraway

3 tlin 9 cyuc 4 kcak 3 tcen 3 dwat 0.6 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyik hpa7tli flat-prikliwis hpa7tmwatli fyifxre7t hjonli

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

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

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

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

dwatta Antiseptic Antispasmodic Aromatic Carminative Digestive Emmenagogue Expectorant Galactagogue Ophthalmic Parasiticide Stimulant Caraway has a long history of use as a household remedy especially in the treatment of digestive complaints where its antispasmodic action soothes the digestive tract and its carminative action relieves bloating caused by wind and improves the appetite[4, 238, 254]. It is often added to laxative medicines to prevent griping[238]. The seed is antiseptic, antispasmodic, aromatic, carminative, digestive, emmenagogue, expectorant, galactagogue and stimulant[4, 7, 9, 21, 46, 165, 222, 240]. It can be chewed raw for the almost immediate relief of indigestion and can also be made into infusions[238]. The seed is also used in the treatment of bronchitis and are an ingredient of cough remedies, especially useful for children[254]. The seed is also said to increase the production of breast milk in nursing mothers[254]. The seed is harvested when fully ripe, then dried and stored in a cool, dry place out of the sunlight[244]. The essential oil can be extracted from the seed and has similar properties[4]. A tea made from the seeds is a pleasant stomachic and carminative, it has been used to treat flatulent colic[207, 222]. The seed is used in Tibetan medicine where it is considered to have an acrid taste and a heating potency[241]. It is used to treat failing vision and loss of appetite[241]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Carum carvi* for dyspeptic complaints (see [302] for critics of commission E).

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

propta Seed - it is best sown in situ as soon as it is ripe in late summer and early autumn[4, 200]. The seed can also be

March/April in situ[200], though in areas with cool summers the plants might not produce a crop of ripe seeds[238]. Plants are very sensitive to root disturbance and should not be transplanted.

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

4.2.31 Prunus avium

Wild Cherry, Sweet cherry

3 tlin 7 cyuc 4 kcaak 4 tcan 2 dwat 18 m hku
hmimhtut cyutli tcup hwicli hraslutnyik hpa7tli flatprikliw
hpa7tmwatli dyatxre7t hjonli

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

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

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

tcanta Dye Gum Tannin Wood Agroforestry Uses: Wild cherry is essentially a pioneer species, and quickly colonises clearings by seeds and suckering, forming secondary woodland, but is often out-competed later by other hardwood species. It is used extensively in Europe for the afforestation of agricultural land and it is also valued for wildlife and amenity plantings[1195]. The flowers are a good source of pollen and nectar for bees[74, 1145]. This species is a bad companion for potatoes, making them more susceptible to potato blight[201], it also suppresses the growth of wheat[18]. It also grows badly with plum trees, its roots giving out an antagonistic secretion[201]. Other Uses: A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. The bark, especially of the root, contains the dye phlorizin[74]. The wood contains the dye xylan[74]. The seed contains around 30% oil[74]. The bark usually only contains small amounts of tannin, but this sometimes rises to 16%[223]. This species has been utilized to breed cherry cultivars with resistance to frost and a number of diseases. Among cultivated forms there are very

ornamental ones with double and pink flowers, motley dissected leaves as well as with a drooping crown[1145]. The heartwood is pinkish-brown; the sapwood red. The grain is fine and straight, with a satiny texture. The wood is firm, compact, and generally free from defects. A valuable, attractive timber that is easy to work, it is used for turnery, furniture, cabinet making, panelling, musical instruments etc[46, 74, 100, 115, 1195]. The red sapwood is valued in turnery and woodwork[74].

dwatta Antitussive Astringent Diuretic Tonic The fruit stalks are astringent, diuretic and tonic[4, 7, 238]. A decoction is used in the treatment of cystitis, oedema, bronchial complaints, looseness of the bowels and anaemia[4, 238]. An aromatic resin can be obtained by making small incisions in the trunk[7]. This has been used as an inhalant in the treatment of persistent coughs[7]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

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

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

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

root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is suckering with new plants from underground runners away from the plant [2-1].

4.2.32 *Arctium lappa*

Great Burdock, Gobo

3 tin 7 cyuc 4 kcaak 2 tcan 5 dwat 2 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikrlwis
hpa7tmwatli fyifkre7t hjonli

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

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

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

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

dwatta Alterative Antibacterial Antifungal Antiphlogistic Antipsoriatic Aperient Blood purifier Carminative Cholagogue Depurative Diaphoretic Diuretic Eczema Hypoglycaemic StomachicBurdock is one of the foremost detoxifying herbs in both Chinese and Western herbal medicine[254]. The dried root of one year old plants is the official herb, but the leaves and fruits can also be used[4]. It is used to treat conditions caused by an 'overload' of toxins, such as throat and other infections, boils, rashes and other skin problems[254]. The root is thought to be particularly good at helping to eliminate heavy metals from the body[254]. The plant is also part of a North American formula called *essiac* which is a popular treatment for cancer. Its effectiveness has never been reliably proven or disproven since controlled studies have not been carried out. The other herbs included in the formula are *Rumex acetosella*, *Ulmus rubra* and *Rheum palmatum*[254]. The plant is antibacterial, antifungal, carminative[9, 21, 147, 165, 176]. It has soothing, mucilaginous properties and is said to be one of the most certain cures for many types of skin diseases, burns, bruises

etc[4, 244]. It is used in the treatment of herpes, eczema, acne, impetigo, ringworm, boils, bites etc[244]. The plant can be taken internally as an infusion, or used externally as a wash[244]. Use with caution[165]. The roots of one-year old plants are harvested in mid-summer and dried. They are alterative, aperient, blood purifier, cholagogue, depurative, diaphoretic, diuretic and stomachic[218, 222]. The seed is alterative, antiphlogistic, depurative, diaphoretic and diuretic[218]. Recent research has shown that seed extracts lower blood sugar levels[238]. The seed is harvested in the summer and dried for later use[254]. The crushed seed is poulticed onto bruises[222]. The leaves are poulticed onto burns, ulcers and sores[222].

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

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

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

4.2.33 *Amaranthus cruentus*

Purple Amaranth, Red amaranth

3 tin 11 cyuc 4 kcaak 2 tcan 2 dwat 2 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikrlwis
hpa7tmwatli fyif hjonli

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

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

kcakta Edible Parts: Leaves SeedEdible Uses: ColouringLeaves - cooked as a spinach[183]. The mild-flavoured

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

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

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

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

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

nwatta Prefers a well-drained fertile soil in a sunny position[200]. Requires a hot sheltered position if it is to do well[K]. Tolerates a pH in the range 4 to 7.5. Plants should not be given inorganic fertilizers, see notes above on toxicity. This species is cultivated for its edible seed in many parts of S. America and in Japan[58, 97, 183]. There is at least one named variety, 'Oeschberg' is a very productive plant, growing 1 metre tall and can yield up to 2.5 tonnes per hectare[183]. This species is the most adaptable of the grain amaranths, it also flowers under a wider range of daylength hours than the other species[183]. Most if not all members of this genus photosynthesize by a more efficient method than most plants. Called the 'C4 carbon-fixation pathway', this process is particularly efficient at high temperatures, in bright sunlight and under dry conditions[196]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is clumping, giving the plant a clumping habit. The predictable growth behaviour makes it easier to maintain without having to apply containment methods[2-1].

4.2.34 *Smilacina stellata*

Star-Flowered Lily Of The Valley

3 tlin 7 cyuc 4 kcaok 0 tcant 2 dwat 0.6 m hkuc
pcimhmim cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli sre7t hjonli

drutta *Smilacina stellata* is a PERENNIAL growing to 0.6 m (2ft) by 0.6 m (2ft in). See above for USDA hardiness.

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

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

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

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

nrakta N. America - British Columbia to California and east to Virginia and Newfoundland. ksacta Woods, thickets and open meadows, on gravelly and alluvial soils[43, 85]. Sand dunes, marginal woodlands, oak openings from sea level to 3200 metres[270].

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

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

4.2.35 *Vaccinium myrtillus*

Bilberry, Whortleberry

3 tlin 7 cyuc 4 kcaok 1 tcant 3 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli frusflat
hpa7tmwatli fyifxre7t hjonli

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

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

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

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

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

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

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

nwatta Requires a moist but freely-draining lime free soil, preferring one that is rich in peat or a light loamy soil with added leaf-mould[11, 200]. Prefers a very acid soil with a pH in the range of 4.5 to 6, plants soon become chlorotic when lime is present. Succeeds in full sun or light shade though it fruits better in a sunny position[17, 200]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. Tolerates some shade, succeeding in light woodland. Very tolerant of wind

and exposure[186]. Plants do not always do well in sheltered positions and they fruit better in an exposed position[115]. They can also form the ground layer in acid woods[186]. A freely suckering shrub when growing well[182]. Plants quickly regenerate from below ground level if they are burnt and also tolerate some grazing[186]. One report says the plant is self-sterile[3], another that it is self-fertile[17]. The fruits are relished by wildlife and the plants provide food for a number of insect species[186]. Plants in this genus are notably resistant to honey fungus[200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is flat with shallow roots spreading near the soil surface [2-1].

4.2.36 Prunus serotina

Rum Cherry - Wild Cherry, Black Cherry, Wild Black Cherry 3 tin 9 cyuc 4 kcak 0 tcan 2 dwat 18 m hkuc htut cyutli tcup hwicli hrasjlutnyk hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

drutta Prunus serotina is a deciduous Tree growing to 18 m (59ft) by 8 m (26ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

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

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

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

dwatta Antidiarrhoeal Antitussive Astringent Dysentery Pectoral Sedative Stomachic Tonic Rum cherry was widely employed medicinally by various native North American Indian tribes who used it to treat a variety of complaints[257]. It is little, if at all, used in modern herbalism. The bark of the root, trunk and branches is antitussive, astringent, pectoral, sedative, stomachic, tonic[4, 21, 95, 165, 238]. The medicinal properties of this plant are destroyed by boiling, so the plant should only be allowed to steep in warm water[213]. The root bark and the aromatic inner bark have expectorant and mild sedative properties and a tea made from either of them has been used to ease pain in the early stages of labour[213, 222]. The tea is also used in the treatment of fevers, colds, sore throats, diarrhoea etc[22, 257]. The bark is harvested in the autumn and should not be stored for longer than one year since it quickly loses its medicinal

properties[4, 213]. Young thin bark is preferred[213]. A decoction of the inner bark has been used in the treatment of laryngitis[257]. The root bark has been used as a wash on old sores and ulcers[257]. The bark contains the glycoside prunasin, which is converted in the digestive tract to the highly toxic hydrocyanic acid[222]. Prunasin is at its highest level in the bark in the autumn[222] so the bark is harvested at this time and can be dried for later use[254]. In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238]. The fruit is astringent and has been used in the treatment of dysentery[213].

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

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

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

4.2.37 *Rhus glabra*

Smooth Sumach

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

htut cyutli kyucutcup hwicli hyishrasjlutnyik hpa7tli flatprik-lwis hpa7tmwatli nyanhjen hjonli

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

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

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

astrigent. Root - peeled and eaten raw[161, 183]. This report should be treated with some caution due to possible toxicity[214]. Young shoots - peeled and eaten raw[183, 257]. This report should be treated with some caution due to possible toxicity[214]. The bark has been eaten as a delicacy by children[257]. This report should be treated with some caution due to possible toxicity[214].

tcanta Dye Hedge Hedge Mordant Oil Pioneer Shelterbelt Soil stabilization Tannin Wood The leaves are rich in tannin, containing about 10 - 25%[171]. Up to 31.2% has been obtained from some plants[223]. They can be collected as they fall in the autumn and used as a brown dye or as a mordant[169]. The twigs and root are also rich in tannin[149]. A black and a red dye is obtained from the fruit[4, 257]. A black dye is obtained from the leaves, bark and roots[257]. An orange or yellow dye is obtained from the roots harvested in spring[46, 61, 257]. A light yellow dye is obtained from the pulp of the stems[257]. The inner bark, mixed with bloodroot (*Sanguinaria canadensis*) and the inner bark of wild plum (*Prunus sp.*) has been used to make a yellow dye[257]. An oil is extracted from the seeds[4]. It attains a tallow-like consistency on standing and is used to make candles. These burn brilliantly, though they emit a pungent smoke[4]. The plant has an extensive root system and is fairly wind tolerant, though branches can be broken off in very strong winds. It is planted for soil stabilization and as a shelter screen[200]. It can quickly establish itself in open sunny locations and so can be used as a pioneer species for establishing woodlands[229]. Wood - soft, light, brittle[101, 149].

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

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

propta Seed - best sown in a cold frame as soon as it is ripe. Pre-soak the seed for 24 hours in hot water (starting at a temperature of 80 - 90c and allowing it to cool) prior to sowing in order to leach out any germination inhibitors[200]. This soak water can be drunk and has a delicious lemon-flavour. The stored seed also needs hot water treatment and can be sown in early spring in a cold frame[200]. When they

large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 10cm with a heel, July/August in a frame[200]. Root cuttings 4cm long taken in December and potted up vertically in a greenhouse. Good percentage[78, 200]. Suckers in late autumn to winter[200].

nwatta Landscape Uses:Border, Specimen. Succeeds in a well-drained fertile soil in full sun[11, 200]. Tolerates poor sandy soils[200]. A very hardy plant, when fully dormant it can tolerate temperatures down to at least -25°C[200]. However, the young growth in spring can be damaged by late frosts. A fast-growing but short-lived plant in the wild[229]. Single-stem plants are short-lived in cultivation, but if the plants are coppiced regularly and allowed to form thickets, then they will live longer and also be more ornamental with larger leaves[238]. Any coppicing is best carried out in early spring[238]. It is a very ornamental plant, there are some named varieties[182]. Closely allied to *R. typhina*[11], it hybridizes with that species where their ranges overlap[101, 229]. Plants have brittle branches and these can be broken off in strong winds[200]. Plants are also susceptible to coral spot fungus[11]. Plants in this genus are notably resistant to honey fungus[200]. A good bee plant[K]. Many of the species in this genus are highly toxic and can also cause severe irritation to the skin of some people, whilst other species such as this one are not poisonous. It is relatively simple to distinguish which is which, the poisonous species have axillary panicles and smooth fruits whilst non-poisonous species have compound terminal panicles and fruits covered with acid crimson hairs[1, 4]. The toxic species are sometimes separated into their own genus, *Toxicodendron*, by some botanists[200]. Dioecious. Male and female plants must be grown if seed is required. Special Features: Attracts birds, North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.38 *Prunus maritima*

Beach Plum, Graves' plum
3 tlin 7 cyuc 4 ckak 3 tcan 1 dwat m hkc
htut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

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

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

excess, however, it can cause respiratory failure and even death.

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

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

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

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

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

nwatta Thrives in a well-drained moisture-retentive loamy soil, doing well on limestone[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Requires a sunny position[11]. Tolerates maritime exposure[11, 102]. The beach plum is cultivated for its edible fruit in N. America, there are some named varieties[183]. The fruit is often sold in local markets[46] and the plant is of potential commercial importance[171]. The fruit seldom ripens when grown in the interior of America[2]. The cultivar 'Eastham' has large well-flavoured fruit and is a heavy cropper[200]. 'Hancock' is an early ripening form with sweet juicy fruit[200]. 'Squibnocket' is of high quality and is also a good sand binder[200]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 6 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A clumping plant, forming a colony from shoots away from the crown but with a limited spread [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.39 *Streptopus roseus*

Scotberry, Rosybell
3 tlin 7 cyuc 4 ckak 0 tcan 2 dwat 0.5 m hkc
pcimhmim cyutli tcup hwicli hrasjlut hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

4.2.40 *Vaccinium corymbosum*

High-Bush Blueberry, American Blueberry, Swamp Blueberry, Blueberry

3 tlin 8 cyuc 4 kcak 0 tcan 1 dwat 2 m hkuc
hmhmhtut cyutli tcup hwicli hrasjlut hpa7tli frusflat
hpa7tmwatli dyatxre7t hjonli

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

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

dwatta Astringent Pectoral Vitamin CAstringent, pectoral[201].

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

propta Seed - sow late winter in a greenhouse in a lime-free potting mix and only just cover the seed[78]. Stored seed might require a period of up to 3 months cold stratification[113]. Another report says that it is best to sow the seed

in a greenhouse as soon as it is ripe[200]. Once they are about 5cm tall, prick the seedlings out into individual pots and grow them on in a lightly shaded position in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of 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 Landscape Uses: Border, Massing, Seashore Requires a moist but freely-draining lime free soil, preferring one that is rich in peat or a light loamy soil with added leaf-mould[11, 200]. Prefers a very acid soil with a pH in the range of 4.5 to 6, plants soon become chlorotic when lime is present. Succeeds in full sun or light shade though it fruits better in a sunny position[200]. Requires shelter from strong winds[200]. Hardy to about -25°C[184]. Often cultivated for its edible fruit in America[183], it is the most common and successful blueberry to be cultivated in Britain[11]. There are many named varieties[183]. A very variable plant, it usually blossoms freely in Britain[11]. Plants are at least partially self-sterile, more than one variety is required in order to obtain good yields of fruit[182]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. leave the fruit on the shrub until the last minute, as the fruit is very acidic and will not ripen after being picked. Does not grow well with blackberries or raspberries[201]. Closely related to *V. atrococcum* and *V. virgatum*[182]. Plants in this genus are notably resistant to honey fungus[200]. Special Features:Attracts birds, North American native, Edible, Wetlands plant, Attracts butterflies, Attractive flowers or blooms. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

4.2.41 *Dentaria diphylla*

Crinkleroot

3 tlin 8 cyuc 4 kcak 0 tcan 2 dwat 0.3 m hkuc
pcimhmht cyutli tcup hwicli hrasjlut hpa7tli flatprikliw
hpa7tmwatli xre7t hjonli

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

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

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

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

propta Seed - sow spring in a cold frame. Germination usually takes place within 1 - 3 weeks at 15°C[175]. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in a greenhouse or cold frame for the first two years, planting them out when dormant in late summer. Division in early spring or after the plant dies down in the summer. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

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

4.2.42 *Brassica oleracea botrytis*

Cauliflower

3 tlin 10 cyuc 4 kcak 3 tcan 0 dwat 0.8 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik-
wis hpa7tmwatli fyifxre7t hjonli

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

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

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

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

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

nwatta Succeeds in full sun in a well-drained moisture-retentive fertile soil with plenty of lime[37, 200, 264]. Cauliflowers, especially the winter and spring maturing types, should not be given a soil that is too rich in nitrogen since this can encourage soft, sappy growth that is more susceptible to winter cold damage[264]. Prefers a heavy soil[16]. Requires a warm sunny position[16]. Prefers a pH in the range 6 to 7[200], though it tolerates a pH in the range 4.3 to 8.3. Succeeds in maritime gardens[200]. Lack of moisture in the growing season can cause the plant to produce small or deformed curds[264]. Summer varieties are not very cold hardy and will be damaged by light frosts, winter cauliflower plants are more hardy and will tolerate temperatures down to about -6°C, though the curds are more sensitive and can suffer damage at about -2°C[200]. This damage can often be prevented by bending over the leaves so that they cover the curd. Cauliflowers are widely grown for their edible immature flower heads (or curd). There are many named varieties and, by careful selection, it is possible to provide a year round supply. The summer and autumn maturing cultivars are annuals, they need to produce a certain number of leaves before curd development will be initiated. The optimum temperature for this is around 17°C, but at temperatures above 20°C the curds will either be of poor quality or not be produced at all[200]. Winter and spring maturing forms are biennial and need exposure to temperatures below 10°C before they will produce curds and once again, this will not happen unless the plant has reached a certain size[200]. Grows well with celery and other aromatic plants since these seem to deter insect predations[18, 20, 201]. Grows badly with beet, tomatoes, onions and strawberries[20, 201].

4.2.43 *Helianthus pauciflorus*

Stiff Sunflower, Prairie Sunflower

3 tlin 7 cyuc 4 kcak 1 tcan 0 dwat 1.5 m hkuc
htut cyutli hgatkuyuctup hwicli hrasjlutnyik hpa7tli flatprik-
wis hpa7tmwatli hjonli

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

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

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

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

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

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

conditions but good on poor soils is Helianthus cusickii (Cusick's sunflower) [1-1].

4.2.44 *Secale cereale*

Rye, Cereal rye

3 tlin 7 cyuc 4 kcaak 3 tcan 1 dwat 1.8 m hkuc
htut cyutli hgattcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

nwatta An easily grown plant, it succeeds in most soils but prefers a well-drained light soil in a sunny position [1, 132]. It thrives on infertile, submarginal areas and is renowned for its ability to grow on sandy soils [269]. Established plants are drought tolerant [1]. The plant is reported to tolerate an annual precipitation in the range of 22 to 176 cm, an annual temperature in the range of 4.3 to 21.3°C and a pH of 4.5 to 8.2 [269]. Rye is a widely cultivated temperate zone cereal crop. It is able to withstand severe climatic conditions and can be grown much further north and at higher altitudes than wheat [13, 34, 57]. Average yields vary widely from country to country, the world average is around 1.6 tonnes per hectare with yields of almost 7 tonnes per hectare achieved in Norway [269]. There are many named varieties [183]. Rye is a rather variable species and botanists have divided it into a number of sub-species, all of which could be of value in breeding programmes. These sub-species are briefly listed below:- *S. cereale afghanicum* (Vavilov) K. Hammer. Native to the Caucasus, western Asia and India. *S. cereale ancestrale* Zhuk. Native to western Asia. *S. cereale dighoricum* Vavilov. Native to the Caucasus and eastern Europe. *S. cereale segetale* Zhuk. Native to temperate Asia. Rye grows well with cornflowers and pansies [18, 20], though it inhibits the growth of poppies and couch grass [18, 20]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is

also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fibrous dividing into a large number of fine roots [2-1].

4.2.45 *Prunus pumila*

Dwarf American Cherry, Sandcherry, Western sandcherry, Eastern sandcherry, Great Lakes sandcherry
3 tlin 8 cyuc 4 kcaak 2 tcan 1 dwat 0.6 m hkuc
htut cyutli hgatkuyuctcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli fyfibre7t hjonli

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

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

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

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

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

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

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

nwatta Requires a well-drained moisture retentive soil [1, 11]. Thrives in a loamy soil, doing well on limestone [11]. Prefers some chalk in the soil but apt to become chlorotic if too much is present [1]. Requires a sunny position [11]. Established plants are very drought resistant [160]. This species is hardy to about -35°C when the plants are fully dormant [160], though the young growth in spring is fairly tender [K]. Plants are susceptible to mildew in low areas [160]. Plants thrive in areas with a short growing season [160]. The fruits are highly resistant to all

fruit worms[160]. Plants can produce fruit in 3 years from seed[160]. A single plant, growing at Hilliers Arboretum in 1999, produced a good crop of fruit with viable seed, so the species is almost certainly self-fertile[K]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2].

4.2.46 *Pyrus ussuriensis*

Harbin Pear, Chinese pear, Ussurian Pear
3 tlin 7 cyuc 4 kcaak 2 tcan 0 dwat 15 m hkuc
hmmimhtut cyutli hgattcup hwicli hraslutnyikfrp hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

4.2.47 *Rubus occidentalis*

Black Raspberry

3 tlin 7 cyuc 4 kcaak 1 tcan 2 dwat 3 m hkuc
hmmimhtut cyutli tcup hwicli hraslutnyik hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

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

kcakta Edible Parts: Fruit StemEdible Uses: TeaFruit - raw or cooked and used in pies, preserves etc[2, 3, 34, 62, 85, 101, 183]. It is of variable quality, with the finest forms

having a rich acid flavour[2]. The hemispherical fruit is about 15mm in diameter[200]. Young shoots - raw or cooked like rhubarb[101, 161, 183, 257]. They are harvested as they emerge through the soil in the spring, and whilst they are still tender, and then peeled[K]. A tea is made from the leaves and another from the bark of the root[161, 183], 257.

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

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

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

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

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

4.2.48 *Rubus canadensis*

American Dewberry, Smooth blackberry

3 tlin 7 cyuc 4 kcaak 1 tcan 1 dwat 2.5 m hkuc
hmmimhtut cyutli tcup hwicli hraslutnyik hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Rubus canadensis* is a deciduous Shrub growing to 2.5 m (8ft 2in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Apomictic (reproduce by seeds formed without sexual fusion). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

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

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

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

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

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

4.2.49 *Medeola virginiana*

Indian Cucumber Root

3 tlin 7 cyuc 4 kcaak 1 tcan 1 dwat 0.3 m hkuc hmim cyutli tcup hwicli hrasljut hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

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

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

tcanta Scented plant.

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

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

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

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

4.2.50 *Claytonia sibirica*

Pink Purslane, Siberian springbeauty

3 tlin 7 cyuc 4 kcaak 3 tcan 1 dwat 0.2 m hkuc pcmhmimhtut cyutli kyuctup hwicli hyishrasljutnyik hpa7tli frusflatprikliwis hpa7tmwatli fyifxre7t hjonli

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

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

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

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

nrakta E. Asia - Siberia. Western N. America - Alaska to California. Naturalized in Britain. ksacta Damp woods, shaded streamsides etc, especially on sandy acid soils[17, 50]. Thickets of red alder, dogwood, vine-leaf maple, moist shaded coniferous forests from sea level to 2000 metres[270].

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

nwatta A very tolerant and easily grown plant, it prefers a moist peaty soil[1] and is unhappy in dry situations[K]. It succeeds in full sun[200] though is happier when given some shade and also grows in the dense shade of beech trees[88]. Plants usually self-sow freely[200, K]. This is an excellent and trouble-free salad plant. It is extremely cold-hardy and can provide edible leaves all year round in all areas of the country even if it is not given protection[K]. *Montia sibirica* (L.) Howell is a synonym of *Claytonia sibirica* L. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A clumping mat former. Forming a dense prostrate carpet spreading indefinitely [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

4.2.51 *Mentha x piperita vulgaris*

Black Peppermint

3 tlin 7 cyuc 4 kcaak 3 tcan 5 dwat 0.5 m hkuc hmimhtut cyutli tcup hwicli hrasljutnyikfrisp hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

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

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

kcakta Edible Parts: LeavesEdible Uses: Condiment TeaLeaves - raw or cooked. A strong peppermint flavour, they are used as a flavouring in salads or cooked foods[2, 27, 105]. This plant should not be used by pregnant women, see the notes above on toxicity. An essential oil from the leaves and flowers is used as a flavouring in sweets, chewing

gum, ice cream etc[183]. A herb tea is made from the fresh or dried leaves[21, 183].

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

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

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

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

nwatta Succeeds in most soils and situations so long as the soil is not too dry[1, 200]. Grows well in heavy clay soils. A sunny position is best for the production of essential oils, but plants also succeed in partial shade. Prefers a slightly acid soil[16]. A commonly grown herb[4], it is often cultivated commercially for its essential oil[61]. This is the black form of peppermint and it is said to produce a superior essential oil, making it the preferred choice as a food flavouring and for medicinal purposes. The oil is of better quality when the plant is grown on dry soils[115]. Most mints have fairly aggressive spreading roots and, unless you have the space to let them roam, they need to be restrained by some means such as planting them in containers that are buried in the soil[K]. Hybridizes freely with other members of this genus. The flowers are very attractive to bees and butterflies[24]. A good companion for growing near cabbages and tomatoes, helping to keep them free of insect pests[20]. Members of this genus are rarely if ever troubled by browsing deer[233].

4.2.52 *Rhus aromatica*

Lemon Sumach, Fragrant sumac

3 tlin 9 cyuc 4 kcaak 2 tcan 2 dwat 1.2 m hkuc

htut cyutli hgatkuyuctcup hwicli hyishrsas]lutnyik hpa7tli flat-prikwis hpa7mwatli nyanhjen hjonli

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

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

ksakta Edible Parts: Fruit OilEdible Uses: Drink Oil-Fruit - raw or cooked[2, 22]. The fruit is small with very little flesh, but it is easily harvested and when soaked for 10 - 30 minutes in hot or cold water makes a very refreshing lemonade-like drink (without any fizz of course)[61, 85, 183, K]. The mixture should not be boiled since this will release tannic acids and make the drink astringent. The fruit can also be dried and ground into a powder then mixed with corn meal and used in cakes, porridges etc[183].

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

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

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

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

nwatta Landscape Uses:Border, Erosion control, Foundation, Ground cover, Massing, Seashore, Woodland garden. Succeeds in a well-drained fertile soil in full sun[11, 200]. Tolerates poor soils[169, 200]. Established plants are drought resistant[169]. A very hardy plant when fully dormant, tolerating temperatures down to about -25°c[184]. However, the young growth in spring can be damaged by late frosts. Many of the species in this genus are highly toxic and can also cause severe irritation to the skin of some people, whilst other species such as this one are not poisonous. It is relatively simple to distinguish which is which, the poisonous species have axillary panicles and smooth fruits

non-poisonous species are compound terminal panicles and fruits covered with acid crimson hairs[1, 4]. The toxic species are sometimes separated into their own genus, *Toxicodendron*, by some botanists[200]. This species is a low suckering shrub[182]. There is a specially low growing form, var. *arenaria*, that is found growing on sand dunes in the mid-west of N. America[184]. A polymorphic species[43]. Plants are susceptible to coral spot fungus[11]. Plants have brittle branches that are easily damaged in very strong winds[11]. Plants in this genus are notably resistant to honey fungus[200]. This species transplants easily[169]. The plant has an offensive smell[149]. Or, to go by another nose, the bruised leaves emit a delicious resinous scent[245]. Dioecious. Male and female plants must be grown if seed is required. Special Features: Attracts birds, North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (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 suckering with new plants from underground runners away from the plant [1-2].

4.2.53 *Mentha spicata*

Spearmint

3 tlin 9 cyuc 4 kcaak 3 tcan 3 dwat 0.6 m hkuc
hmmihtut cyutli tcup hwicli hras|lutnykfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

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

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

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

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

dwatta Antiemetic Antiseptic Antispasmodic Cancer Carminative Diuretic Poultice Restorative Stimulant Stomachic Spearmint is a commonly used domestic herbal remedy. A tea made from the leaves has traditionally been used in the treatment of fevers, headaches, digestive disorders and

various minor ailments[222]. The herb is antiemetic, antispasmodic, carminative, diuretic, restorative, stimulant and stomachic[4, 21, 46, 218]. The leaves should be harvested when the plant is just coming into flower; and can be dried for later use[4]. The stems are macerated and used as a poultice on bruises[218]. The essential oil in the leaves is antiseptic, though it is toxic in large doses[222]. Both the essential oil and the stems are used in folk remedies for cancer[218]. A poultice prepared from the leaves is said to remedy tumours[218].

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

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

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

4.2.54 *Malus pumila*

Paradise Apple, Common Apple, Apple Tree
3 tlin 9 cyuc 4 kcaak 3 tcan 2 dwat 7 m hkuc
hmmihtut cyutli tcup hwicli hras|lutnykfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Malus pumila* is a deciduous Tree growing to 7 m (23ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in April. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy)

and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

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

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

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

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

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

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

4.2.55 *Erythronium americanum*

Trout Lily, Dogtooth violet
3 tin 7 cyuc 4 kcak 3 tcan 1 dwat 0.2 m hkuc
hhim cytli tcup hwcli hrasjlut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

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

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

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

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

dwatta Antisporophatic Contraceptive Emetic Emollient Poultice All parts of the plant, but especially the bulb and the fresh leaves, are strongly emetic and are not used internally[4]. The fresh leaves are also antisporophatic and emollient and are used as an infusion or stimulating poultice applied to swellings, tumours and scrofulous ulcers[4, 106, 254]. The juice from crushed leaves has been applied to wounds that are not healing[257]. A poultice of the crushed bulbs has been applied to swellings and to help remove splinters[257]. The raw plant, excluding the roots, has been used by native North American young girls to prevent conception[257].

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

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

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

ery year [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2]. The root pattern is a corm swelling at the stem base [1-2].

4.2.56 Actinidia kolomikta

Kiwi
3 tlin 8 cyuc 4 kcaok 0 tcan 0 dwat 10 m hkuc
hmmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli nyanhjen hjonli

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

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

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

propta Seed - sow spring in a greenhouse[133]. It is probably best if the seed is given 3 months stratification[113], either sow it in a cold frame as soon as it is ripe in November or as soon as it is received. Fresh seed germinates in 2 - 3 months at 10°C, stored seed can take longer[133]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. When the plants are 30cm or more tall, plant them out into their permanent positions in late spring or early summer, after the last expected frosts[K]. Most seedlings are male[126]. The seedlings are subject to damping off, they must be kept well ventilated[113]. Cuttings of softwood as soon as ready in spring in a frame[K]. Cuttings of half-ripe wood, July/August in a frame. Very high percentage[113]. Cuttings of ripe wood, October/November in a frame.

nwatta Landscape Uses:Arbor. Prefers a sound loamy neutral soil[11, 200]. Succeeds in semi-shade but full sun is best for fruit production[200]. Another report says that the plant prefers semi-shade[160]. Prefers a sheltered position[200]. When grown in a sunny position the leaves normally develop a strong variegation[219]. Prefers a neutral soil, plants become more variegated when they are grown in a limy soil[200]. Very cold resistant, dormant plants are hardy to at least -30°C but new growth in spring can be cut back by late frosts[74, 160, 200]. Plants grow well on a wall and can also be grown into trees[1]. Cats are very fond of this plant and can damage it by scratching it etc[1, 3, 200]. A very ornamental plant[1], there are some named varieties that have been selected for their edible fruit[183, 200]. The form most often cultivated in this country is a male and it is quite possible that all the plants grown here have been developed from a single clone[219]. Often confused with the closely related A. polygama, but it can be distinguished by its leaves which are heart-shaped at the base whilst those of A. polygama are tapered[219]. Fruits are produced on second year wood or on fruit spurs on older wood[126], any pruning is best carried out in the winter[219]. The flowers are sweetly scented[184]. This is a climbing plant, supporting itself by twining around branches etc[200]. Plants in this genus are notably resistant to honey fungus[200]. Dioecious. Male and female plants must be grown if seed is required. Special Features:Not North American native, Fragrant flowers, Attractive flowers or blooms. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants

withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. Woody. Growth habit is a single or multiple shooting vine from a crown [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.2.57 Ribes aureum

Golden Currant

3 tlin 8 cyuc 4 kcaok 0 tcan 1 dwat 2.4 m hkuc
hmmimhtut cyutli kyucutoc hwicli hrasljutnyik hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

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

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

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

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

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

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11]. Succeeds in full sun but is also quite tolerant of shade though not fruiting so well in such a position[11]. Grows well on exposed dry sites[85]. Very tolerant of being transplanted[85]. Plants can spread by means of underground rhizomes, especially when growing in moist conditions[164]. Hardy to about -20°C[200]. The fruit can be red, black, yellow, golden or reddish-brown[164]. A very ornamental plant[1], it is closely allied to R. odoratum[11]. Plants can harbour a stage of white pine blister rust, so should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200]. Sometimes cultivated for its edible fruit, there are some named varieties[183]. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the

heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.58 Allium moly

Golden Garlic, Ornamental Onion

3 tlin 9 cyuc 4 kcak 2c 1 dwat 30 m hkuc

htut cyutli hqatkyuctcup hwicli hrasjutniykfrp hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

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

nwatta Landscape Uses:Border, Container, Foundation, Massing, Rock garden, Woodland garden. An easily grown plant[203], preferring a sunny position in a light well-drained soil[1, 90]. Established plants are fairly drought tolerant[190]. The bulbs should be planted fairly deeply[1]. The dormant bulbs are fairly hardy and will withstand soil temperatures down to at least -10°C[214]. There are some named forms selected for their ornamental value[203]. The flowers are softly scented[245]. Some forms of this species, especially *A. moly bulbiferum*[203], produce bulbils in the flowering head[42] and can be invasive[203]. The species type

is sometimes considered to be invasive, though it has not proved so with most people[203]. It is useful for naturalising between shrubs and grows well at the base of a beech hedge in a wet garden[203]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. It is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. Special Features:Not North American native, Naturalizing, Attracts butterflies, Suitable for dried flowers.

4.2.59 Acer saccharinum

Silver Maple, River Maple, Soft Maple

3 tlin 9 cyuc 3 kcak 4 tc 1 dwat 30 m hkuc

hmimhtut cyutli tcup hwicli hrasjutniykfrp hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta *Acer saccharinum* is a deciduous Tree growing to 30 m (98ft) by 15 m (49ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from February to March, and the seeds ripen from April to June. 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 can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Inner bark Leaves Sap Seed Edible Uses: Sweetener The sap contains sugar and can be used as a drink or be concentrated into a syrup by boiling off the water[4, 61, 82, 159]. The syrup is used as a sweetener on many foods. The yield is only half that of *A. saccharum*[2]. It is said to be sweeter and whiter than *A. saccharum*[183]. The sap can be harvested in the late winter, the flow is best on warm sunny days following a frost. The best sap production comes from cold-winter areas with continental climates. Self-sown seedlings, gathered in early spring, are eaten fresh or dried for later use[177, 213]. Seeds - cooked. The wings are removed and the seeds boiled then eaten hot[213]. Good crops are produced nearly every year in the wild[229]. The seed is about 12mm long and is produced in small clusters[82]. Inner bark - cooked. It is dried, ground into a powder and then used as a thickening in soups etc or mixed with cereals when making bread[105, 161, 177, 257]. The related Oregon Maple (*Acer macrophyllum*) has yellow flower clusters, sweet with nectar, eaten raw[183]. No information was found for this species. Carbon farming - Staple Crop: sugar.

tcanta Companion Dye Fodder Preservative Rust Shelterbelt Wood The leaves are packed around apples, root crops etc to help preserve them[18, 20]. A fairly wind-tolerant tree, it can be used in shelterbelt plantings[200]. The branches are rather brittle, however, and can break off even in minor storms[226]. The stems are used in making baskets[257]. The boiled inner bark yields a brown dye[106]. Mixed with lead sulphate this produces a blue/black dye which can also be used as an ink[106]. A black dye is obtained from the twigs and bark[257]. The bark can be boiled, along with hemlock (*Tsuga* spp) and swamp oak bark (*Quercus bicolor*) to make a wash to remove rust from iron and steel, and to prevent further rusting[257]. Wood - rather brittle, close-grained, hard, strong, easily worked but not durable. It weighs 32lb per cubic metre. It has many uses such as veneer, cooperage, furniture, flooring and pulp[11, 46, 82, 227, 235]. Carbon Farming - Industrial Crop: biomass. Agroforestry Services: crop shade. Fodder: bark. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Antispasmodic Astringent Dysentery Ophthalmic Skin VDA n infusion of the bark is used in the treatment of coughs, cramps and dysentery[257]. The infusion is also applied externally to old, stubborn running sores[257]. A compound infusion is used in the treatment of 'female complaints'[257]. The inner bark is boiled and used with water as a wash for sore eyes[257]. An infusion is used internally in the treatment of diarrhoea[257]. An infusion of the root bark has been used in the treatment of gonorrhoea[257].

nrakta Eastern N. America - New Brunswick to Florida, west to Oklahoma, Kansas and Nebraska. ksacta Banks of

invers, usually in sandy soils[43, 82]. Trees are occasionally found in deep often submerged swamps[82].

propta Seed - best sown as soon as it is ripe in the spring in a cold frame. It usually germinates immediately and by the end of summer has formed a small tree with several pairs of leaves[82]. Stored seed quickly loses its viability. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter.

nwatta Agroforestry Services: Crop shade Fodder: Bank Industrial Crop: Biomass Management: Coppice Management: Standard Staple Crop: SugarLandscape Uses:Erosion control, Firewood, Aggressive surface roots possible, Woodland garden. Of easy cultivation, it prefers a good moist well-drained soil[1, 11] but does well in much wetter soils than most member of the genus. Succeeds in most soils including chalk[98]. Another report says that this species is liable to become chlorotic as a result of iron deficiency when it is grown on alkaline soils. Grows well in heavy clay soils. Prefers a moderately sunny position[11, 200]. Tolerates atmospheric pollution[200]. Fairly wind-tolerant[200]. The wood is brittle and branches are liable to break off the tree in high winds[11, 200]. Trees can tolerate short periods of flooding, but are very susceptible to fire[229]. A very ornamental[1] and fast growing tree[11, 98], but it is short-lived[227], seldom surviving longer than 125 - 140 years[229]. The tree has invasive roots and these often interfere with sewer pipes and drainage tiles around houses[226]. The silver maple is a bad companion plant, inhibiting the growth of nearby plants[18, 20]. Special Features:Attracts birds, North American native, Naturalizing, Carbon farming - Cultivation: experimental. Management: standard, coppice. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2].

4.2.60 Juglans cinerea

Butternut - White Walnut, Butternut
3 tlin 7 cyuc 3 kcaak 3 tcan 3 dwat 25 m hkcuc
htut cyutl tcup hwicli hrasljatnyik hpa7tli flatprikrlwis
hpa7tmwatli fyif hjonli

drutta Juglans cinerea is a deciduous Tree growing to 25 m (82ft) by 20 m (65ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June, and the seeds ripen from October 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 Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista The naphthoquinone constituents may cause gastric (stomach) irritation. Avoid in patients with gallstones [301].

ksakta Edible Parts: Oil Sap SeedEdible Uses: Oil SweetenerSeed - eaten raw or ground into a powder and used with cereal flours in making cakes, biscuits, muffins, bread etc[183]. Oily and sweet tasting with a rich agreeable flavour[11, 62, 63, 101, 183]. The oil in the seed is not very stable and the seed soon becomes rancid once it is opened[82]. The kernel is usually only about 20% by weight of the whole seed[160] and is hard to extract[226]. The unripe fruit can be pickled[183]. The seed is 3 - 6cm in diameter and is produced in clusters of 3 - 5 fruits[82, 229]. An edible oil is obtained from the seed[101, 117, 183], it tends to go rancid quickly. The sweet sap is tapped in spring and can be used as a refreshing drink[101]. It can also be boiled down to a syrup or sugar, or added to maple syrup[82, 101, 117, 159, 183].

tcanta Dye Herbicide Oil WoodA yellow to orange dye is obtained from the seed husks[46, 61, 82] and from the bark[57]. It is dark brown[95, 101]. It does not require a mordant[169]. The seed husks can be dried and stored for later use[169]. A light brown dye is obtained from the young twigs, leaves, buds and unripe fruit[117, 169, 213]. It does not require a mordant[169]. The leaves can also be dried and stored for later use[169]. A black dye is obtained from the young roots[257]. Plants produce chemicals which can inhibit the growth of other plants. These chemicals are dissolved out of the leaves when it rains and are washed down to the ground below, reducing the growth of plants under the tree[18, 20, 159]. The roots of this species produce substances that are toxic to many plant species, especially apples (Malus species), members of the Ericaceae, Potentilla spp and the white pines (certain Pinus spp.)[200, 201]. Wood - coarse-grained, light, soft, not strong, very attractive[46, 61, 82, 117]. It weighs 25lb per cubic foot[235]. It is not as valuable a crop as the black walnut (J. nigra), but is used indoors for furniture, doors etc[229]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Astringent Cholagogue Dysentery Febrifuge Laxative Odontalgic StomachicButternut was used by various native North American Indian tribes as a laxative and tonic remedy to treat a variety of conditions including rheumatic and arthritic joints, headaches, dysentery, constipation and wounds[254]. In modern herbalism it is considered to be a valuable remedy for chronic constipation, gently encouraging regular bowel movements. It is especially beneficial when combined with a carminative herb such as Angelica archangelica[254]. The quills or inner bark are one of the few potent laxatives that are safe to use in pregnancy [301]. Butternut also lowers cholesterol levels and promotes the clearance of waste products by the liver[254]. An infusion of the inner-bark is used as a cholagogue, febrifuge, mild laxative and stomachic[4, 46, 61, 82, 159, 165, 213, 222]. It is effective in small doses without causing cramps[222]. The bark is best collected in the autumn[213]. Best collected in late spring according to another report[4]. An infusion of the dried outer bark is used in the treatment of toothache and dysentery[226]. The oil from the nuts is used in the treatment of tapeworms and fungal infections[4, 222].

nrakta Eastern N. America - New Brunswick to Georgia, west to Arkansas and North Dakota. ksakta Usually found in rich moist soils of woods and river terraces[43, 82], but it also grows on dry rocky soils, especially if these are on limestone[226].

propta The seed is best sown as soon as it is ripe in individual deep pots in a cold frame[80]. You need to protect it from mice, birds, squirrels etc. The seed usually germinates in late winter or the spring. Plant out the seedlings into their permanent positions in early summer and give some protection from the cold for their first winter or two. The seed can also be stored in cool moist conditions (such s the salad compartment of a fridge) over the winter and sown in early spring but it may then require a period of cold stratification before it will germinate[78, 80].

nwatta Management: Standard Regional Crop Staple Crop: Protein-oilLandscape Uses:Specimen. Requires a deep well-drained loam and a position sheltered from strong winds[1, 11]. Prefers a slightly alkaline soil[200]. Prefers a sandy soil with a pH around 6 to 7[160]. Dislikes compacted soils or clay sub-soils, otherwise trees grow well on most soils[160]. This is the most cold-resistant of the walnuts[117], tolerating temperatures down to about -35°C in

N. America when fully dormant[160]. It is less hardy in Britain, unfortunately, because the wood does not ripen so well here due to our cooler summers. The young growth in spring can be damaged by late frosts[200]. Sometimes cultivated in N. America for its edible seed, there are some named varieties[63, 117, 183]. Trees can come into bearing in 6 - 10 years from seed and fruiting is usually biennial[160]. The trees are quite short-lived, seldom exceeding 80 - 90 years[229]. They require about 105 frost-free days in order to ripen a crop in N. America[160]. Unfortunately, they have not proved successful as a nut tree in Britain, usually failing to produce a crop[11]. This is probably due to our cooler summers[11]. It is sometimes planted as a timber tree in Denmark and Rumania[50]. Plants produce a deep taproot and are intolerant of root disturbance. Seedlings should be planted out into their permanent positions as soon as possible and given some protection for their first few winters since they are somewhat tender when young[1, 11]. Trees cast a dense shade which reduces the amount of species able to grow below them[201]. We have no specific information for this species, but the roots of several members of this genus produce substances that are toxic to many plant species, especially apples (*Malus* species), members of the Ericaceae, *Potentilla* spp and the white pines (certain *Pinus* spp.)[200]. The leaves of many species also secrete substances that have an inhibitory affect on plants growing underneath them. All in all this is not a very good companion plant[K]. Plants should only be pruned when they are fully dormant in winter or when they are in full leaf, otherwise any cuts will bleed profusely[200]. Hybridizes with *J. aillantifolia*, there are some named varieties of this hybrid that are grown for their edible seed[160]. Special Features:North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

4.2.61 *Vitis aestivalis argentifolia*

Summer Grape
3 tin 7 cyuc 3 kcak 0 tcan 0 dwat 25 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flat-prikrlwis hpa7tmwatli xre7t hjonli

drutta *Vitis aestivalis argentifolia* is a deciduous Climber growing to 25 m (82ft 0in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June to July, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Fruit Leaves SapEdible Uses: Fruit - raw, cooked in jellies, jams, pies etc or dried for later use[1, 2, 22, 46, 183]. Sweet and agreeably flavoured[2, 183]. The taste is best after a frost[101].The dried fruits are eaten as snacks or used in baked goods[183]. The fruit is about 8mm in diameter[200]. Leaves - cooked[55, 159]. Young leaves are wrapped around other foods and then baked, they impart a pleasant flavour. A sweet watery sap is obtained from the stem[101, 183]. Used as a refreshing drink. Young tendrils - raw or cooked[55, 85, 159].

tcanta DyeA yellow dye is obtained from the fresh or dried leaves[168].

nrakta Southern and Eastern N. America - Ontario to Alabama. Locally naturalized in Europe[50]. ksacta Dry woods and thickets[43].

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]. Plants climb by means of tendrils[182]. The flowers are sweetly scented with the aroma of mignonette[245]. Any pruning should be carried out in winter when the plants are dormant otherwise they bleed profusely[182, 200]. This subspecies has a more northerly and inland range than the type and might therefore be more suitable for fruit production in Britain (particularly the northern provenances). Plants in this genus are notably susceptible to honey fungus[200].

4.2.62 *Tilia americana*

American Basswood, Carolina basswood, Basswood, AmericanBasswood, American Linden
3 tin 9 cyuc 3 kcak 3 tcan 3 dwat 25 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flat-prikrlwis hpa7tmwatli xre7t hjonli

drutta *Tilia americana* is a deciduous Tree growing to 25 m (82ft) by 12 m (39ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in July, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerates strong winds but not maritime exposure.

pcista Frequent consumption of the tea made from the flowers may cause heart damage[222].

kcakta Edible Parts: Flowers Leaves SapEdible Uses: Chocolate Sweetener TeaYoung leaves - raw or cooked[257]. A mild flavour and a tender but mucilaginous texture, they are very nice in salads[K]. The leaves can be cooked as greens[257]. Sap - obtained from next to the bark and used as a refreshing drink[105, 161, 177]. It can also be concentrated into a syrup and used as a sweetener[183]. Flowers - raw. They can be added to salads[183]. The flowers are used as a tea substitute. They are sweet and fragrant[183]. A very good chocolate substitute is made from a paste of the ground fruits and flowers[2, 105, 177, 183]. Trials on marketing the product failed because the paste decomposes readily[2].

tcanta Fibre Shelterbelt WoodA tough fibre is obtained from the inner bark[46, 227]. The bark is soaked in water then boiled. It is then rubbed on a stick to separate the fibres which can then be used for making thread for sewing, fine yarn for weaving bags, clothing etc and cordage for making nets, shoes, twine, mats etc[189, 226, 227, 257]. A fairly wind resistant tree, it can be grown as part of a shelterbelt planting[200]. Wood - soft, straight grained, light, weak, not durable, easily worked, resistant to splitting, it holds nails badly, holds glue, paint and lacquer well, seasons well but shrinks considerably. It weighs 28lb per cubic foot[227], is odourless and bland-tasting[226]. A commercially important timber in its native range[266, 229]. The white wood is excellent for turning and carving, it is used for making woodenware such as spoons, cheap furniture, pulp etc[46, 82, 171, 227, 229]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Antispasmodic Demulcent Diaphoretic Diuretic Dysentery Ophthalmic Poultice Sedative Vermifuge A tea made from the inner bark is applied to burns - it soothes and softens the skin[213]. It is taken internally in the treatment of lung complaints, dysentery, heart burn and weak stomach[222, 257]. The bark is diuretic[257]. An infusion has been taken to promote urination[257]. A decoction of the bark, mixed with cornmeal, has been used as a poultice to draw out boils[222, 257]. A tea made from the fresh or dried flowers is antispasmodic, diaphoretic and sedative[226]. It is used in the treatment of hypertension, hardening of the arteries, digestive complaints associated with anxiety, feverish colds, respiratory catarrh, migraine etc[238]. Lime flowers are said to develop narcotic properties as they age and so they should only be harvested when freshly opened[238]. An infusion of the leaves has been used as an eyewash[257]. A poultice of the leaves has been used in the treatment of burns and scalds, broken bones and swollen areas[257]. A tea or tincture made from the leaves, flowers and buds has traditionally been used for nervous headaches, restlessness and painful digestion[222]. Use with caution, see notes above on toxicity. A decoction of the roots and the bark has been taken in the treatment of internal haemorrhaging[257]. A decoction of the roots has been used as a vermifuge to rid the body of worms[257].

nrakta Central and Eastern N. America - New Brunswick to Florida, west to Texas and Manitoba. ksacta Rich, often moist, soils of woods and bottomlands, often forming pure stands[82, 227].

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

nwatta Landscape Uses:Pollard, Screen, Specimen, Street tree. Prefers a good moist loamy alkaline to neutral soil but succeeds on slightly acid soils[11, 200]. Grows poorly on any very dry or very wet soils[200]. Dislikes exposed positions[200]. Another entry in the same book says that it is fairly wind tolerant[200]. Succeeds in full sun or semi-shade[188]. A fast-growing and moderately long-lived tree in the wild, it starts producing seed when about 15 years old and continues for at least another 85 years[229]. It is generally unsatisfactory in Britain, preferring a continental climate and growing more slowly and not usually producing fertile seed in areas with cool summers[200]. Grows best in a woodland situation, young plants tolerate a reasonable level of side shade[200]. They are highly shade-tolerant according to another report[226]. Trees respond well to coppicing, sending up lots of suckers from the roots[226]. Lime trees tend to hybridise freely if other members of the genus are growing nearby[238]. If growing plants from seed it is important to ensure the seed came from a wild source or from an isolated clump of the single species[K]. A good bee plant[61, 159]. Trees are usually attacked by aphids which cover the ground and the leaves with a sticky honeydew[188]. Quite tolerant of root disturbance, semi-mature trees up to 5 metres tall have been transplanted successfully. Plants in this genus are notably resistant to honey fungus[200]. Special Features:North American native, Fragrant flowers, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin

to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

4.2.63 *Betula lenta*

Cherry Birch, Sweet birch, Black Birch, Cherry Birch 3 tin 7 cyuc 3 kcaak 4 tcan 3 dwat 24 m hkuc hmimhtut cyutli tcup hwclli hrasjlutnyikfrrip hpa7tli frusflat-priklwis hpa7tmwatli hjonli

drutta *Betula lenta* is a deciduous Tree growing to 24 m (78ft 9in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in April, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The essential oil obtained from the bark contains 97 - 99% methyl salicylate. This is very toxic when taken orally, and it can also be absorbed through the skin, resulting in human fatalities. As little as 4, 700 mg can be fatal in children[269]. 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: Inner bark Sap Edible Uses: Condiment Sweetener Tealner bark - cooked or dried and ground into a powder[4, 62, 102]. Sweet and spicy[177]. The dried inner bark can be used as a thickener in soups etc or can be added to flour when making bread 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[K]. Sap - raw or cooked[2, 46, 102]. A sweet flavour[61, 177]. It is harvested in early spring, before the leaves unfurl, by tapping the trunk. The flow is best on sunny days following a heavy frost. A delicious drink, it can also be concentrated into a syrup or sugar[183]. The sap can be fermented to make birch beer or vinegar[183]. 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 boill'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]. The dried leaves and bark from the larger roots are a delightful tea substitute[177, 183]. A wholesome, agreeable tea is made from the essential oil contained in the inner bark and twigs[21, 55, 62]. This essential oil is also used as a winter-green flavouring in foods[183].

tcanta Essential Fuel Tannin Wood An essential oil is obtained from the bark and twigs, it is distilled in quantity and is an item of commerce[235]. It can be used medicinally, as a food flavouring, as an ingredient in cosmetic shampoos and also to make a wholesome tea[11, 21, 46, 171, 269]. The oil, when decolourized, is similar to 'Oil of Wintergreen' (obtained from *Gaultheria procumbens*) and is considered to be of superior quality[245]. The tree is coppiced every 5 years and all parts are distilled for the oil[245]. The tree grows up to 3 metres tall in this 5 year period[245]. The greatest yield of oil is obtained if the tree is harvested in the summer[245]. The oil distilled from the wood is insect repellent[269]. The bark contains up to 16% tannin[223]. The thin outer bark is waterproof and has been used as the outer cladding on dwellings, canoes etc[257]. It has also been used to make baskets, dishes, buckets etc[257]. Wood - very strong, close grained, hard, heavy. The wood is richly marked[4], it weighs 40lb per cubic foot and is exploited commercially for making floors, furniture, tools etc[11, 46, 61, 82, 171, 229]. It

...makes an excellent fuel[11, 46, 61, 229]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Analgesic Anthelmintic Antiinflammatory Antiseborrheic Astringent Diaphoretic Diuretic Dysentery Rubefacient Stimulant UrinaryThe bark is anthelmintic, astringent, diaphoretic, diuretic and stimulant[4, 21]. A tea made from the bark is used in the treatment of fevers, stomach aches and lung ailments[222, 257], it is said to be an excellent tonic in cases of dysentery and to be useful in the treatment of gravel and female obstructions[4]. An essential oil distilled from the bark is anti-inflammatory, analgesic and rubefacient[222]. It is used in the treatment of rheumatism, bladder infections, neuralgia etc[222]. The oil, called 'oil of wintergreen', used to be produced commercially, but it is now manufactured synthetically[222]. A tea made from the twigs is used in the treatment of fevers[222]. The leaves can be chewed or used in an infusion in the treatment of dysentery[257]. 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 Eastern N. America - Quebec to Georgia, west to Alberta and Ohio. Moist Rich woodlands, preferring north-facing slopes and kaosta soils[43, 62]. It is also found on rocky soils[229].

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:Specimen, Woodland garden. An easily grown plant, it succeeds in a well-drained loamy soil in a sheltered position[11, 200]. Grows well in heavy clay soils. Dislikes wet soils[200]. Shade tolerant[200]. Cherry birch is said to tolerate an annual precipitation of ca 60 to 150cm, an average annual temperature range of 5 to 12°C, and a pH of 4.5 to 7.5[269]. Hybridizes freely with other members of this genus[50]. The bruised foliage has a strong smell of wintergreen[200]. A good plant to grow near the compost heap, aiding the fermentation process[20]. Trees can be coppiced on a cycle of 5 years or more[245]. Trees are notably susceptible to honey fungus[200]. Special Features: Attracts birds, North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2].

4.2.64 *Acer negundo*

Box Elder

3 tlin 8 cyuc 3 kcaak 3 tcan 1 dwat 21 m hkuc
hmmihmtut cyutli tcup hwicli hrasj|lutnyikfrip hpa7tli flatprikli-
wis hpa7tmwatli nyanhjen hjonli

...dutta *Acer negundo* is a deciduous Tree growing to 21 m (69ft) by 8 m (26ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from April to May, 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. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Inner bark Leaves Sap SeedEdible Uses: SweetenerThe sap contains a reasonable quantity of sugar and can be used as a refreshing drink or be concentrated into a syrup[11, 46, 61, 82, 159]. The syrup is used as a sweetener on many foods. The sugar content is inferior to *A. saccharum* according to one report[149] whilst another says that it is highly valued as a producer of sweet sap[183]. The sugar from the sap of this tree is said to be whiter than that from other maples[183]. To obtain the sap, bore a hole on the sunny side of the trunk into the sapwood about 1 metre above the ground at anytime from about January 1st until the leaves appear[85]. The flow is best on a warm day after a frost[213]. The best sap production comes from cold-winter areas with continental climates. Inner bark - raw or cooked. It can be dried, ground into a powder and then used as a thickener in soups etc or be added to cereal flours when making bread, cakes etc[257]. The inner bark can also be boiled until the sugar crystallizes out of it[257]. Self-sown seedlings, gathered in early spring, are eaten fresh or dried for later use[213]. Seeds - cooked. The wings are removed and the seeds boiled then eaten hot[213]. The seed is up to 12mm long and is produced in small clusters[82].

tcanta Musical Preservative Shelterbelt WoodThe leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. A fairly wind-tolerant tree, it can be used in mixed plantings as a part of shelterbelt plantings[200]. Wood - soft, weak, light, close grained. It weighs 27lb per cubic foot[235]. Of little commercial value, it is used for boxes, cheap furniture, pulp, fuel etc[46, 61, 82, 149, 229]. Large trunk burls or knots have been used to make drums[257].

dwatta EmeticA tea made from the inner bark is used as an emetic[222, 257].

nrakta N. America - Nova Scotia to Florida, west to California and Manitoba. ksakta Found in a variety of soil types, growing best in lowland sites along rivers, streams, ponds or seasonally flooded flats[229].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter. The cuttings of this species usually root easily. Budding onto *A. negundo* in early summer usually works well. The bud should develop a small shoot in the summer otherwise it is unlikely to survive the winter.

nwatta Of easy cultivation, succeeding in most soils[202] but preferring a rich moist well-drained soil and a sunny position[11]. Grows well in heavy clay soils and in sandy soils[188]. Plants often become chlorotic on very alkaline soils[202]. Plants are hardy to about -18°C[202]. A fast growing but short-lived tree in the wild, living for 75 - 100 years[149, 229]. It is fairly wind-tolerant[200], but the branches have a tendency to break in strong winds[226]. This species is cultivated commercially in Illinois for its

sap[183]. Another report says that this is one of the least productive species for sugar[226]. A very ornamental plant[1], there are several named varieties[200]. This tree is a bad companion plant that is said to inhibit the growth of neighbouring plants[18, 20]. This species is notably resistant to honey fungus[88, 200]. Very tolerant of pruning, it can regenerate from old wood if it is cut back hard[202]. Dioecious. Male and female plants must be grown if seed is required.

4.2.65 *Celtis occidentalis*

Hackberry, Common hackberry
3 tin 9 cyuc 3 ckac 2 tcan 1 dwat 20 m hkc
htut cyutli hgatkuyctup hwicli hyshrasljut hpa7tli flatpriklwis hpa7tmwatli xre7t hjonli
drutta *Celtis occidentalis* is a deciduous Tree growing to 20 m (65ft) by 20 m (65ft) 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 October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw[2, 3, 55, 149]. Very sweet and pleasant tasting, they can be eaten out of hand or can be used for making jellies, preserves etc[183]. The fruit is often produced abundantly in Britain, it is about the size of a blackcurrant, but there is very little flesh surrounding a large seed and it is therefore a very fiddly crop[K]. The fruit is dark orange to purple- or blue-black when fully ripe, usually about 7-11mm in diameter, though occasionally up to 20mm[270]. The flesh is dry and mealy but with a pleasant sweet taste[K]. Seed[57]. No more details. The fruit and seed can be ground up finely together and used as a flavouring[161, 183]. The N. American Indians ate them with parched corn[183].

tcanta Dye Fuel Miscellany Shelterbelt Wood A dye is obtained from the roots[61]. No more details are given. Fairly wind-tolerant, it can be planted as part of a shelterbelt[200]. Wood - rather soft, weak, coarse-grained, heavy. It weighs 45lb per cubic foot and is sometimes used commercially for cheap furniture, veneer, fencing fuel etc[46, 61, 82, 171, 227].

dwatta Miscellany VDA n extract obtained from the wood has been used in the treatment of jaundice[226]. A decoction of the bark has been used in the treatment of sore throats[257]. When combined with powdered shells it has been used to treat VD[257].

nrakta Eastern N. America - Quebec to Manitoba, North Carolina, Missouri and Oklahoma. ksacta Dry to moist and rich woods, river banks, rocky barrens etc[43]. Frequently found on limestone soils[229].

propta Seed - best sown as soon as it is ripe in a cold frame[200]. Stored seed is best given 2 - 3 months cold stratification and then sown February/March in a greenhouse[78, 200]. Germination rates are usually good, though the stored seed might take 12 months or more to germinate. The seed can be stored for up to 5 years[113]. As soon as they are large enough to handle, prick the seedlings out into individual pots. The leaves of seedlings often have a lot of white patches without chlorophyll, this is normal and older plants produce normal green leaves. Grow the seedlings on in a cold frame for their first winter, and plant them out in the following late spring or early summer[K]. Give them some protection from the cold for their first winter outdoors. Cuttings

nwatta Landscape Uses: Firewood, Aggressive surface roots possible, Street tree, Woodland garden. Succeeds in any reasonably good soil, preferring a good fertile well-drained loamy soil[1, 11, 200]. Succeeds on dry gravels and on sandy soils[200]. Tolerates alkaline soils[160]. Established plants are very drought resistant[149, 160, 200]. Wind resistant[160]. Trees transplant easily[226]. Trees prefer hotter summers and more sunlight than are normally experienced in Britain, they often do not fully ripen their wood when growing in this country and they are then very subject to die-back in winter[1, 11, 200]. Plants in the wild are very variable in size, ranging from small shrubs to large trees[43].

They are fast-growing[98, 229], and can be very long-lived, perhaps to 1000 years[200]. Only to 200 years according to another report[229]. They usually produce good crops of fruit annually[229]. Trees respond well to coppicing, readily sending up suckers after cutting or the top being killed off in a fire[226]. Plants in this genus are notably resistant to honey fungus[200]. Special Features: North American native, Naturalizing, Wetlands plant, Attracts butterflies, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2].

4.2.66 *Betula nigra*

River Birch, Black Birch, Red Birch, Water Birch, River Birch
3 tin 9 cyuc 3 ckac 0 tcan 2 dwat 20 m hkc
hmimhtut cyutli tcup hwicli hrasljutnykfrkip hpa7tli flatpriklwis hpa7tmwatli hjonli

drutta *Betula nigra* is a deciduous Tree growing to 20 m (65ft 7in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in March, and the seeds ripen in June. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista 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: Sap Edible Uses: Sweetener Sap - raw or cooked[2]. A sweet flavour[177]. Harvested in early spring, before the leaves unfurl. The trunk is tapped by drilling a hole about 6mm wide and about 4cm deep. The sap flows best on warm sunny days following a hard frost. It makes a refreshing drink[55, 95] and can also be concentrated into a syrup or sugar[183]. The sap can be fermented to make birch beer or vinegar[183]. 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 scum'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].

tcanta Besom Soil stabilization Wood Young branches are used to make besoms, whisks etc[6]. This species has an extensive root system and is sometimes planted for erosion control along the banks of streams[227]. Wood - light, strong, close grained and hard, but it contains many knots because of the numerous branches along the trunk. It weighs 36lb per cubic foot. Of little use commercially, though it is sometimes used for furniture, turnery etc[46, 61, 82, 227, 229].

dwatta Antiseborrheic Diuretic Dysentery Salve Stomachic Urinary A salve was made by boiling the buds until they were thick and pasty, sulphur was added and this was then applied externally to skin sores and ringworm[213]. The leaves have been chewed, or used as an infusion, in the treatment of dysentery[257]. An infusion of the bark has been used to treat stomach problems, 'milky' urine and difficult urination with discharge[257]. 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 Eastern N. America - New Hampshire to Florida. ksacta Banks of streams, by swamps etc, in deep rich soil that is often inundated for weeks at a time[43].

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, Pest tolerant, Specimen, Woodland garden. Succeeds in a well-drained loamy soil in a sheltered position[11, 43, 200]. Grows well in heavy clay soils. Likes its roots within reach of water[11]. Dislikes wet soils according to another report[200]. Shade tolerant[200]. Hybridizes freely with other members of this genus[50]. A good plant to grow near the compost heap, aiding the fermentation process[20]. Trees are notably susceptible to honey fungus[200]. Special Features: Attracts birds, North American native, Attracts butterflies, Inconspicuous flowers or blooms.

4.2.67 *Vitis aestivalis*

Summer Grape, Long grape

3 tlin 7 cyuc 3 kcak 0 tcan 1 dwat 20 m hkc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flat-
prikliwis hpa7tmwatli xre7t hjonli

drutta *Vitis aestivalis* is a deciduous Climber growing to 20 m (65ft 7in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June to July, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Fruit Leaves Sap Edible Uses: Fruit - raw, cooked in jellies, jams, pies etc or dried for later use[1, 2, 22, 46, 183]. Agreeably flavoured[11, 200]. The taste is best after a frost[101]. The dried fruits are eaten as snacks or used in baked goods[183]. The fruit is about 8mm in diameter[200] and is produced in fairly large bunches[235]. Leaves - cooked[55, 159]. Young leaves are wrapped around other foods and then baked, they impart a pleasant flavour. A sweet watery sap is obtained from the stem[101, 183]. Used as a refreshing drink. Young tendrils - raw or cooked[55, 85, 159].

tcanta Dye A yellow dye is obtained from the fresh or dried leaves[168].

dwatta Diuretic Febrifuge Hepatic Poulitice Stomachic Urinary The leaves are hepatic[257]. They have been used in the treatment of the liver[257]. The wilted leaves have been applied as a poultice to the breasts to draw away soreness after the birth of a child[257]. A decoction of the leaves and stems has been taken in the treatment of stomach aches, fevers and headaches[257]. An infusion of the bark has been used to treat urinary complaints[257].

nrakta Southern and Eastern N. America - Ontario to Alabama. Locally naturalized in Europe[50]. ksacta Dry woods and thickets[43]. Stream bottom woods, usually on sandy soils, in Texas[274].

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]. Plants climb by means of tendrils[182]. They grow particularly well up elm trees[18]. The flowers are sweetly scented with the aroma of mignonette[245]. Any pruning should be carried out in winter when the plants are dormant otherwise they bleed profusely[182, 200]. This species is a parent of some cultivars that are grown for their edible fruits in N. America[1, 61]. Resistant to Phylloxera disease, a disease that almost destroyed the European grape crops[61]. 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]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.68 *Abies balsamea*

Balsam Fir

3 tlin 6 cyuc 3 kcak 0 tcan 5 dwat 15 m hkc
pcimhmimhtut cyutli tcup hwicli hrasjlutnyik frip hpa7tli flat-
prikliwis hpa7tmwatli hjonli

drutta *Abies balsamea* is an evergreen Tree growing to 15 m (49ft) by 5 m (16ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in leaf all year, in flower in May, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. 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 full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil. The plant is not wind tolerant.

pcista The oleoresin (Canada balsam) is reported to produce dermatitis when applied as perfume[222, 269]. The foliage has also induced contact dermatitis[269].

kcakta Edible Parts: Inner bark Edible Uses: Condiment Gum Tealner bark - cooked. It is usually dried, ground into a powder and then used as a thickening in soups etc or mixed with cereals when making bread[105, 177]. Fir bark is a delight to chew in winter or early spring, slightly mucilaginous and sweetish, better raw than cooked[269]. Another report says that it is an emergency food and is only used when all else fails[183]. An aromatic resinous pitch is found in blisters in the bark[64]. When eaten raw it is delicious and chewy[101, 183]. Another report says that the balsam or pitch, in extreme emergency, forms a highly concentrated, though disagreeable, food[269]. An oleoresin from the pitch is used as a flavouring in sweets, baked goods, ice cream and drinks[183]. Tips of young shoots are used as a tea substitute[177, 183].

tcanta Adhesive Fibre Gum Kindling Microscope Repellent Resin Stuffing Waterproofing Wood The balsamic resin 'Balm of Gilead'[11, 46] or 'Canada Balsam' according to other reports[64, 226, 238] is obtained during July and August from blisters in the bark or by cutting pockets in the wood[222]. Another report says that it is a turpentine[171]. The term Canada Balsam is a misnomer because balsams are supposed to contain benzoic and cinnamic acids, both absent from the Canada oleoresin[269]. Turpentine is also a misnomer, implying that the oleoresin is entirely steam volatile. Actually it contains 70 - 80% resin, only 16 - 20% volatile oil[269]. Canada Balsam yields 15 - 25% volatile oil, the resin being used for caulking and incense[269]. It is used medicinally and in dentistry, also in the manufacture of glues, candles and as a cement for microscopes and slides - it has a

high refractive index resembling that of glass[11, 46, 64, 82, 222, 226, 238]. The pitch has also been used as a waterproofing material for the seams of canoes[257]. The average yield is about 8 - 10 oz per tree[171]. The resin is also a fixative in soaps and perfumery[171, 238]. "Turpentine" is usually collected during July-August by breaking the turpentine blisters into small metal cans with sharp-pointed lids. Trees are then allowed to recuperate for 1 - 2 years before being harvested again[269]. The leaves and young branches are used as a stuffing material for pillows etc - they impart a pleasant scent[46, 61, 257] and also repel moths[169]. The leaves contain an average of 0.65% essential oil, though it can go up to 1.4% or even higher[269]. One analysis of the essential oils reports 14.6% bornyl acetate, 36.1% b-pinene, 11.1% 3-carene, 11.1% limonene, 6.8% camphene, and 8.4% a-pinene[269]. To harvest the oil, it would appear that the branches should be snipped off younger trees in early spring[269]. Fifteen year old trees yield 70% more leaf oil than 110-year-old trees; oil yields are highest in January - March and September, they are lowest from April to August[269]. A thread can be made from the roots[257]. Wood - light, soft, coarse grained, not strong, not very durable. Weighs 24lb per cubic foot[235]. Used mainly for pulp, it is not used much for lumber except in the manufacture of crates etc[46, 82, 226, 229]. The wood is commercially valuable for timber even though it is relatively soft, weak, and perishable[269]. Balsam fir is used in the US for timber and plywood, and is the mainstay of the pulp wood industry in the Northeast. The wood, which is rich in pitch, burns well and can be used as a kindling[257]

dwatwa Analgesic Antiscorbutic Antiseptic Diuretic Poul-
tice Stimulant Tonic VDThe resin obtained from the balsam fir (see 'Uses notes' below) has been used throughout the world and is a very effective antiseptic and healing agent. It is used as a healing and analgesic protective covering for burns, bruises, wounds and sores[213, 222, 226]. It is also used to treat sore nipples[213] and is said to be one of the best curatives for a sore throat[245]. The buds, resin, and/or sap are used in folk remedies for treating cancers, corns, and warts[269]. The resin is also antiscorbutic, diaphoretic, diuretic, stimulant and tonic[4, 171, 222]. It is used internally in propriety mixtures to treat coughs and diarrhoea, though taken in excess it is purgative[238]. A warm liquid of the gummy sap was drunk as a treatment for gonorrhoea[212]. A tea made from the leaves is antiscorbutic[4, 171]. It is used in the treatment of coughs, colds and fevers[222]. The leaves and young shoots are best harvested in the spring and dried for later use[238]. This plant was widely used medicinally by various North American Indian tribes[257]. The resin was used as an antiseptic healing agent applied externally to wounds, sores, bites etc., it was used as an inhalant to treat headaches and was also taken internally to treat colds, sore throats and various other complaints[257].

nrakta North-eastern N. America - Newfoundland to Virginia, west to Alberta, Michigan and Ohio. ksacta Low swampy grounds where it is often the major component of forests[82]. Also found on well-drained hillsides[82].

propta Seed - sow early February in a greenhouse or outdoors in March[78]. Germination is often poor, usually taking about 6 - 8 weeks[78]. Stratification is said to produce a more even germination so it is probably best to sow the seed in a cold frame as soon as it is ripe in the autumn[80, 113]. Stored seeds should be moist stratified 14 - 28 days at 1 - 5°C, though fresh seed may be sown in autumn without stratification, with target seedling densities in the nursery ca 450 - 500/m², often mulched with sawdust. The seed remains viable for up to 5 years if it is well stored[113]. When large enough to handle, prick the seedlings out into individual pots and grow them on for at least their first winter in pots. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Of slow initial growth, the stock is usually outplanted as 2- to 3-year-old seedlings or 3- to 4-year-old transplants Alternatively, if you have sufficient seed, it is possible to sow in an outdoor seedbed. One report says that it is best to grow the seedlings on in the shade at a density of about 550 plants per square metre[78] whilst another report says that they are best grown on in a sunny position[80]. Trees often self-layer in the wild[226], so this might be a means of increasing named varieties in cultivation[K].

nwatta Landscape Uses:Christmas tree, Screen, Specimen. Prefers a good moist but not water-logged soil[1].

Grows well in heavy clay soils. Very shade tolerant, especially when young[81, 126], but growth is slower in dense shade[81]. Intolerant of atmospheric pollution[1]. Prefers slightly acid conditions down to a pH of about 5[200], though the cultivar 'Hudsonia' is more tolerant of alkaline conditions[238]. Prefers growing on a north-facing slope[200]. A shallow-rooted plant, making it vulnerable to high winds[229]. Balsam fir is estimated to tolerate an annual precipitation of 60 to 150cm, an annual temperature range of 5 to 12°C, and a pH of 4.5 to 7.5[269]. The balsam fir is a fast-growing tree in its native environment[229], but it is fairly short-lived and slow growing in Britain, becoming ungainly after about 20 years[11, 64, 81]. It grows best in the Perthshire valleys of Scotland[11, 185]. New growth takes place from late May to the end of July[185]. Trees are very cold hardy but are often excited into premature growth in mild winters and this new growth is susceptible to damage by late frosts[11]. Female strobili may be wholly or partially aborted up to 6 to 8 weeks after bud burst by late spring frosts[269]. Pollen dispersal can be reduced by adverse weather[269]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm in height. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Trees have a thin bark and are therefore susceptible to forest fires[229]. This species is closely related to *A. fraseri*[11]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. The cones break up on the tree and if seed is required it should be harvested before the cones break up in early autumn[80]. Whilst the typical species is too large for most gardens, there are some named slow-growing dwarf forms that can be grown[238]. Whilst these will not provide the resin, their leaves can be used medicinally[K]. The leaves are strongly aromatic of balsam when crushed[185]. The tree is sometimes grown and used as a 'Christmas tree'[226].
Special Features: North American native, There are no flowers or blooms.

4.2.69 *Betula alleghaniensis*

Yellow Birch, Swamp Birch

3 tin 7 cyuc 3 kcak 4 tcan 2 dwat 12 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnykfrip hpa7tli flatprik-
wis hpa7tmwatli hjonli

drutta *Betula alleghaniensis* is a deciduous Tree growing to 12 m (39ft) by 3 m (9ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in April, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Inner bark SapEdible Uses: Condiment Sweetener Tealner bark - cooked or dried and ground into a powder and used with cereals in making bread[62]. Inner bark is generally only seen as a famine food, used when other forms of starch are not available or are in short supply[K]. Sap - raw or cooked. A sweet flavour[62, 102, 161, 177]. The sap is harvested in early spring, before the leaves unfurl, by tapping the trunk. It flows abundantly, but the sugar content is much lower than maple sap[226]. A pleasant drink, it can also be concentrated into a syrup or fermented into a beer[183, 226]. An old English recipe for the beer is as follows:- "To every Gallon of Birch-water put a quart of Honey, well stir'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]. A tea is made from the twigs and leaves[62, 177]. The dried leaves are used according to another report[183]. An excellent flavour[226]. The twigs and leaves have the flavour of wintergreen and can be used as condiments[183].

tacanta Containers Fuel Waterproofing WoodThe bark is

waterproof and has been used by native peoples as the outer skin of canoes, as roofing material on dwellings and to make containers such as buckets, baskets and dishes[257]. Wood - close-grained, very strong, hard, heavy. The wood is too dense to float[226]. An important source of hardwood lumber, it is used for furniture, boxes, tubs of wheels, floors etc[46, 61, 82, 171, 229]. It is also often used as a fuel[46, 61]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Antiseborrheic Cathartic Emetic Yellow birch is little used medicinally, though a decoction of the bark has been used by the native North American Indians as a blood purifier, acting to cleanse the body by its emetic and cathartic properties[257]. The bark is a source of 'Oil of Wintergreen'[226]. This does have medicinal properties, though it is mainly used as a flavouring in medicines[226].

nrakta North-eastern N. America - Newfoundland to Virginia and Tennessee. **ksakta** Usually found in moist well-drained soils in rich woodlands on lower slopes, it is also found in cool marshlands in the south of its range[62, 229].

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: Specimen, Woodland garden. Succeeds in a well-drained loamy soil in a sheltered position[11, 200]. Grows well in heavy clay soils. Dislikes wet soils[200]. Shade tolerant[200]. A slow-growing tree, it is relatively long-lived for a birch, with specimens 200 years old recorded[229]. Plants often grow taller than the 12 metres mentioned above[229]. The trees are highly susceptible to forest fires, even when wet the bark is highly inflammable[226]. The bruised foliage has a strong smell of wintergreen[200]. Hybridizes freely with other members of this genus[50]. Trees are notably susceptible to honey fungus[200]. Special Features: Attracts birds, North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. 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].

4.2.70 *Malus tschonoskii*

Pillar apple, Crabapple

3 tlin 8 cyuc 3 kcaak 0 tcan 0 dwat 12 m hkuc
hmimhtut cyutli tcup hwicli hras|lutnyikfrip hpa7tli flatprikli-wis hpa7tmwatli xre7t hjonli

drutta *Malus tschonoskii* is a deciduous Tree growing to 12 m (39ft) by 7 m (23ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light

(sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[105, 177]. A gritty texture[1]. A reasonable size, about 2 - 3cm in diameter[200], but the fruit is not freely produced[11, 200]. A tree at Kew is fruiting well, producing fruits about 30mm in diameter and these fruits can hang on the tree all winter[K]. Even when harvested in February the fruits were quite firm, slightly juicy with a strong acid flavour rather like a lemon[K].

nrakta E. Asia - Japan. **ksakta** Woods in C. Japan[58, 109].

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

nwatta Landscape Uses: Border, Specimen, Street tree. An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. This tree is well suited to planting in public-access areas[200]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Not North American native, Fragrant flowers, Attractive flowers or blooms.

4.2.71 *Prunus americana lanata*

3 tlin 7 cyuc 3 kcaak 2 tcan 1 dwat 10 m hkuc
hmimhtut cyutli tcup hwicli hras|lutnyik hpa7tli flatprikli-wis hpa7tmwatli xre7t hjonli

drutta *Prunus americana lanata* is a deciduous Tree growing to 10 m (32ft 10in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in April, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw or cooked[159]. Used mainly in jellies[177]. The fruit is about 25mm in diameter, it has a thick succulent flesh and

contains one large seed[82, 200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta Dye Wood A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Wood - heavy, hard, close-grained, strong[82]. The tree is too small for the wood to be of commercial value[229].

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

nrakta Central and Southern N. America - Indiana to Illinois, south to Texas. ksacta Hillsides and river bottom lands[82].

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

nwatta Thrives in a well-drained moisture-retentive loamy soil, doing well on limestone[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Succeeds in sun or partial shade though it fruits better in a sunny position[11, 200]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.72 *Juniperus scopulorum*

Rocky Mountain Juniper, Weeping Rocky Mountain Juniper, Colorado Red Cedar

3 tlin 7 cyuc 3 kcaak 4 tcan 2 dwat 10 m hkuc
htut cyutli hgatkyuctuc hwicli hrasjlutnyik hpa7tli flatprikl-wisslip hpa7tmwatli nyanhjen hjonli

drutta *Juniperus scopulorum* is an evergreen Tree growing to 10 m (32ft) by 4 m (13ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf all year, in flower from April to May, and the seeds ripen in October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils 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.

kcaakta Edible Parts: Fruit Edible Uses: Coffee Condiment Tea Fruit - raw or cooked[105, 161, 183]. Sweet and fleshy, but strongly flavoured[85, 229]. Resinous[227]. Often used as a flavouring, imparting a sage-like taste, for which purpose it is usually dried and ground into a powder[85, 183]. The fruit can also be dried and ground into a meal for making mush and cakes[183]. The fruits are about 5 - 8mm in diameter[200, 227]. The roasted fruit is a coffee substitute[183]. A tea is made from the fruits and young shoots[183].

tcanta Beads Disinfectant Incense Parasiticide Repellent Shelterbelt Tinder Wax Wood A fragrant wax on the fruits can be obtained by boiling the fruit and skimming off the wax as it floats to the surface. It is used to make aromatic candles but is only present in small quantities[85]. The boughs are used as an incense to fumigate houses and to drive off smells. The wood can be burnt or just hung in the room, or it can be boiled up in water and the water used to wash the walls, floor etc[99]. The bark is employed as a tinder and is also made into a slow match[216]. The dried seeds have been used as beads or as the 'rattle' in rattles[99, 216]. The fruits and the leaves are used as an insect repellent[169]. A strong infusion of the cones is used to kill ticks[99]. Plants can be

grown as a ground cover, the cultivar 'Repens' is especially suitable[208]. A fairly wind resistant tree, it can be grown as part of a shelterbelt planting[200]. In N. America it is used to some extent in re-afforestation and shelterbelt plantings on the prairies[227]. Wood - extremely tough, aromatic, close grained, light, fairly strong in endwise compression but moderately weak in bending, hard, durable in the soil. Used for interior finishes, bows, hoops, hafts, wheels etc[99, 149, 227].

dwatta Antidandruff Appetizer Diaphoretic Disinfectant Diuretic Haemostatic Kidney Laxative Parasiticide Poulitice Sedative Stomachic Tonic VDRocky Mountain juniper was widely employed medicinally by many native North American Indian tribes who used it in particular to treat problems connected with the chest and kidneys[257]. It is little, if at all, used in modern herbalism. A tea made from the terminal shoots has been used in the treatment of VD by some N. American Indian tribes[213]. The treatment has to be taken over a long period of time[257]. The fruits are appetizer, diuretic and stomachic[257]. An infusion has been used in the treatment of stomach, kidney and bladder problems[213, 257]. An infusion of the twigs has been used in the treatment of fevers, pneumonia, coughs and colds[257]. A poultice of the mashed and dampened branches has been applied to skin sores[257]. The leaves are diaphoretic, disinfectant, febrifuge, haemostatic, laxative, sedative and tonic[99, 216, 257]. A decoction has been used in the treatment of internal bleeding, constipation and constant coughing[257]. The leaves have been boiled, then mixed with turpentine and used as an external treatment on rheumatic joints[257]. The leaves have been rubbed into the hair in order to treat dandruff[213, 257].

nrakta Western N. America - British Columbia to Mexico and California. ksacta Scattered singly on dry rocky ridges, foothills and bluffs[82, 85] in montane areas or in dry habitats of the coastal forest region[226]. The best specimens are found on slightly alkaline soils[229].

propta The seed requires a period of cold stratification. The seed has a hard seedcoat and can be very slow to germinate, requiring a cold period followed by a warm period and then another cold spell, each of 2 - 3 months duration[78, 81]. Soaking the seed for 3 - 6 seconds in boiling water may speed up the germination process[11]. The seed is best sown as soon as it is ripe in a cold frame. Some might germinate in the following spring, though most will take another year. Another possibility is to harvest the seed 'green' (when the embryo has fully formed but before the seedcoat has hardened). The seedlings can be potted up into individual pots when they are large enough to handle. Grow on in pots until large enough, then plant out in early summer. When stored dry, the seed can remain viable for several years[1]. Cuttings of mature wood, 5 - 10cm with a heel, September/October in a cold frame. Plant out in the following autumn[1, 78]. Layering in September/October. Takes 12 months[78].

nwatta Landscape Uses: Alpine garden, Border, Screen, Specimen, Street tree. Succeeds in most soils, including chalk[200], so long as they are well drained, preferring a neutral or slightly alkaline soil[1, 11]. A drought tolerant species once established, succeeding in hot dry positions[200]. Plants are fairly wind-resistant[200]. A long-lived but slow-growing tree in its native range[227], it is very slow growing in Britain where it only makes a shrub[185]. Closely allied to *J. virginiana*[1, 81] and hybridising with it where the ranges meet[226]. It differs mainly in the fruit, which takes two years to mature in this species instead of one[226]. Plants are resistant to honey fungus[88]. This tree is apparently resistant to the rust fungus that attacks the closely related *J. virginiana*[149]. Dioecious. Male and female plants must be grown if seed is required. Special Features: North American native, Fragrant foliage, Inconspicuous flowers or blooms. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is flat with shallow roots spreading near the soil surface [2-1].

4.2.73 *Prunus cerasus austera*

Morello Cherry

3 tlin 7 cyuc 3 kcaak 0 tcan 1 dwat 9 m hkuc

prunus cyuthli tcup hwicli hrasljutnyik hpa7tli frusflatprikl-wis hpa7tmwatli fyfxfre7t hjonli

drutta Prunus cerasus austera is a deciduous Tree growing to 9 m (29ft 6in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in May, and the seeds ripen in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

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

kcakta Edible Parts: Fruit Oil Oil Seed Edible Uses: Gum Gum Oil Oil Tea Fruit - raw or cooked[1, 2, 5, 11, 12]. The fruit is neither bitter nor sweet, but is pleasantly acid[11] and it can be eaten out of hand, used in pies, preserves etc or dried for later use[183]. The fruit has a dark juice[11]. The fruit is about 18mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity. An edible oil is obtained from the seed[46, 61]. When refined it is used as a salad oil[183]. The leaves are used as a tea substitute[46, 61, 183]. A gum obtained from the trunk is used for chewing[61, 64].

tcanta Adhesive Dye Gum Gum Hedge Hedge Oil Oil Wood An edible drying oil obtained from the seed is also used in cosmetics[61]. The gum obtained from the stem is also used as an adhesive[61, 64]. Plants can be grown as a hedge[50], succeeding in fairly exposed positions[K]. A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168].

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

nrakta S.E. Europe to W. Asia. ksacta Not known in the wild[11].

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

nwatta Thrives in a well-drained moisture-retentive loamy soil[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Prefers an acid soil according to another report[5]. Succeeds in sun or partial shade though it fruits better in a sunny position[11, 200]. Plants succeed when grown against a north-facing wall, the fruit ripens later in this position thus extending the season[11, K]. Hardy to about -20°C[184]. This subspecies covers the cultivated bitter cherries known as Morello cherries[11]. They have been long cultivated for their edible fruit and there are several named varieties[200]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants produce suckers freely[184]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.74 Prunus cerasus caproniana

Kentish Red Cherry

3 tlin 7 cyuc 3 kcaak 0 tcan 1 dwat 9 m hkuc hmimhtut cyuthli tcup hwicli hrasljutnyik hpa7tli frusflatprikl-wis hpa7tmwatli fyfxfre7t hjonli

drutta Prunus cerasus caproniana is a deciduous Tree growing to 9 m (29ft 6in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in May, and the seeds ripen in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

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

kcakta Edible Parts: Fruit Oil Oil Seed Edible Uses: Gum Gum Oil Oil Tea Fruit - raw or cooked[1, 2, 5, 11, 12]. Neither bitter nor sweet, the fruit is pleasantly acid and can be eaten out of hand, used in pies, preserves etc or dried for later use[183]. The juice is colourless[11]. The fruit is about 18mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity. An edible oil is obtained from the seed[46, 61]. When refined it is used as a salad oil[183]. The leaves are used as a tea substitute[46, 61, 183]. A gum obtained from the trunk is used for chewing[61, 64].

tcanta Adhesive Dye Gum Gum Hedge Hedge Oil Oil Wood An edible drying oil obtained from the seed is also used in cosmetics[61]. The gum obtained from the stem is also used as an adhesive[61, 64]. Plants can be grown as a hedge[50], succeeding in fairly exposed positions[K]. A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168].

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

nrakta S.E. Europe to W. Asia. ksacta Not known in the wild[11].

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

nwatta Thrives in a well-drained moisture-retentive loamy soil[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Prefers an acid soil according to another report[5]. Succeeds in sun or partial shade though it fruits better in a sunny position[11, 200]. Hardy to about -20°C[184]. This subspecies covers the cultivated bitter cherries known as Amarelle cherries - this includes those forms grown in Britain as Kentish Red cherries[11]. They have been long cultivated for their edible fruit and there are several named varieties[200]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants produce suckers freely[184]. Plants in this genus are notably susceptible

to honey fungus[200].

4.2.75 *Malus prunifolia rinkii*

Chinese Apple

3 tlin 7 cyuc 3 kcak 0 tcan 0 dwat 8 m hkuc
hmmihtut cyutli tcup hwicli hraslutnyikfrp hpa7tli flatprikliw
hpa7tmwlati xre7t hjonli

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

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

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[2, 105]. Bitter[200]. Not at all bitter, it makes quite pleasant eating[11]. Used fresh or in preserves etc[22, 46]. The fruit is about 3cm in diameter[200]. Young leaves - cooked[105, 177].

nrakta E. Asia - northern China. ksacta Not known in a truly wild state.

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

nwatta An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[200]. Cultivated for its edible fruit in China, there are many named varieties[11, 22]. This species is a famous fruit tree in N and NE China[266]. Many cultivars have been bred during its long cultivation, the fruit of which differ in shape, color, size, and ripening period[266]. It is also used in apple breeding programmes for its frost resistance[74]. Hybridizes freely with other members of this genus[200]. The fruit is a good wildlife food source, especially for birds[200]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.76 *Prunus americana*

American Plum, American Wild Plum, Wild Plum

3 tlin 8 cyuc 3 kcak 3 tcan 2 dwat 6 m hkuc
hmmihtut cyutli tcup hwicli hraslutnyik hpa7tli flatprikliw
hpa7tmwlati xre7t hjonli

drutta *Prunus americana* is a deciduous Tree growing to 6 m (19ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in April, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Fruit SeedEdible Uses: Fruit - raw, cooked in pies etc or used in preserves[1, 2, 55, 62, 183]. The flesh is succulent and juicy, though it is rather acid with a tough skin[85, 159]. The best forms are pulpy and pleasant tasting[183, 227]. The fruit is best cooked[159], and it can also be dried for later use[85]. The fruit is about 25mm in diameter and contains one large seed[200]. Seed - raw or cooked[85, 183]. Do not eat the seed if it is too bitter - see the notes above on toxicity.

ncanta Broom Disinfectant Dye Miscellany Rootstock Soil stabilization WoodA green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. A red dye can be obtained from the roots[257]. This species is widely used as a rootstock for cultivated plums in North America[160]. The tough, elastic twigs can be bound into bundles and used as brooms for sweeping the floor[257]. Trees often grow wild along streams, where their roots tend to prevent soil erosion[226]. Wood - heavy, hard, close-grained, strong[82]. It weighs 45lb per cubic foot[227]. Of no commercial value because the trunk is too small[227].

dwatta Antiasthmatic Astringent Disinfectant Diuretic Miscellany PoulticeA tea made from the scraped inner bark is used as a wash to treat various skin problems and as a mouth wash to treat sores[213]. A poultice of the inner bark is disinfectant and is used as a treatment on cuts and wounds[257]. The bark is astringent, diuretic and pectoral[257]. It has been used to make a cough syrup[257]. An infusion has been used in the treatment of diarrhoea, kidney and bladder complaints[257]. An infusion of the twigs has been used in the treatment of asthma[257]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta N. America - New York to Florida, extending westwards as far as the Rocky Mountains. ksacta Rich soils in mixed deciduous woodland, by streams, on the borders of swamps and in hedgerows[43, 62, 82].

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe[200]. Sow stored seed in a cold frame as early in the year as possible[200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate[113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood with a heel, July/August in a frame. Difficult, if not impossible. Softwood cuttings from strongly growing plants in spring to early summer in a frame. Difficult, it not impossible. Suckers in late winter.

nwatta Landscape Uses:Border, Espalier, Pest tolerant, Specimen. Thrives in a well-drained moisture-retentive loamy soil, doing well on limestone[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Succeeds in sun or partial shade though it fruits better in a sunny position[11, 200]. Trees are probably hardy to as low as -50°C when fully dormant[160]. A fast-growing but short-lived tree in the wild[229], it is cultivated for its edible fruit in N. America, where there are many named varieties[1, 11, 46]. It flowers well in Britain but rarely fruits well here[11]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants often produce suckers at the roots and form thickets[227]. The branches are brittle[101]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: North American native, Edible, All or parts of this plant are poisonous, Attracts butterflies, Blooms are

very showy. The plant is heat tolerant in zones 8 through 11. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.77 *Malus pumila nervosa*

Crab Apple

3 tlin 7 cyuc 3 kcak 2 tcan 0 dwat 5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrp hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Malus pumila nervosa* is a deciduous Tree growing to 5 m (16ft) by 8 m (26ft). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in April. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked. The fruit can be up to 6cm in diameter[200]. Very astringent and quite harsh[K].

tcanta RootstockCan be used as a dwarfing rootstock for the cultivated apples.

nrakta Britain? ksacta Not known in the wild.

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

nwatta An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. The fruit is a good wildlife food source, especially for birds[200]. Plants have been seen at Kew Gardens bearing huge crops of fruit[K]. Hybridizes freely with other members of this genus[200]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.78 *Amelanchier utahensis*

Utah Serviceberry, Coville's serviceberry
3 tlin 7 cyuc 3 kcak 2 tcan 1 dwat 5 m hkuc

hmimhtut cyutli kyucpucp hwicli hrasjlutnyikfrp hpa7tli flatprik hpa7tmwatli fyifxre7t hjonli

drutta *Amelanchier utahensis* is a deciduous Shrub growing to 5 m (16ft 5in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: FruitEdible Uses: Edible fruit, raw or cooked[105, 172, 229, 257]. The fruit can also be dried and used as a raisin substitute[177, 183]. The fruit is rich in iron and copper[226]. It is produced in small clusters and is about 10mm in diameter[200].

tcanta WoodWood - heavy, hard and strong. The hardness of the wood makes it suitable for use as the spindle of a fire drill[257]. Trees are seldom large enough to be of commercial interest[229]. The wood has been used to make the rims of baskets[257].

dwatta Ophthalmic OxytoxicAn infusion of the inner bark is used to treat snow-blindness[172]. The plant has been used to ease childbirth during labour and delivery[257].

nrakta South-western N. America - Utah to New Mexico. ksacta Drier areas on rimrock valleys, gullies and hillsides from sagebrush desert to middle elevations in mountains[11].

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nwatta Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not waterlogged[11]. Grows well in heavy clay soils. Tolerates dry soils[200]. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible ornamentals. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. This species is closely related to *A. alnifolia*[11]. Hybridizes freely with other members of this genus[200]. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1].

4.2.79 *Malus pumila paradisica*

Paradise Apple

3 tlin 7 cyuc 3 kcak 2 tcan 0 dwat 5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrp hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Malus pumila paradisica* is a deciduous Tree growing to 5 m (16ft 5in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in April. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista All members of this genus contain the toxin hydrogen cyanide in their seeds and possibly also in their leaves, but not in their fruits. Hydrogen cyanide is the substance

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

kcakta Edible Parts: Fruit**Edible Uses:** Fruit - raw or cooked[2, 50]. The fruit can be up to 6cm in diameter[200].
tcanta RootstockCommonly used as a dwarfing rootstock for the cultivated apple, there are several named varieties[200].

nrakta Europe. ksacta Not known in the wild[50].
propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. It usually germinates in late winter. Stored seed requires stratification for 3 months at 1°C and should be sown in a cold frame as soon as it is received[200]. It might not germinate for 12 months or more. Prick out the seedlings into individual pots as soon as they are large enough to handle. If given a rich compost they usually grow away quickly and can be large enough to plant out in late summer, though consider giving them some protection from the cold in their first winter. Otherwise, keep them in pots in a cold frame and plant them out in late spring of the following year. Cuttings of mature wood, November in a frame[11].

nwatta An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. Commonly cultivated as a rootstock for the cultivated apple, there are several named varieties[200]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.80 *Viburnum opulus*

Guelder Rose, Cramp Bark, European cranberrybush, American cranberrybush, Crampbark, European Highbush
3 tlin 8 cyuc 3 kcak 3 tcant 3 dwat 5 m hkuc
hmmimhtut cyutli tcuphja7n hwicli hrasjlutnyikfrip hpa7tli flat-prikwlwisslip hpa7tmwatli fyfixre7t hjonli

drutta *Viburnum opulus* is a deciduous Shrub growing to 5 m (16ft) by 5 m (16ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to July, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil.

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[2, 3, 5, 46]. The fruit is up to 8.5mm in diameter but with a large seed[200]. A sour taste, it is best cooked. The crushed fruit has an unpleasant smell[4]. Used as a cranberry substitute in making, jellies, preserves etc[183]. Some caution is advised, see notes on toxicity at top of the page.

tcanta Dye Hedge Hedge Ink WoodA red dye is obtained from the fruit[13]. An ink can be made from the dried berries[4]. Plants can be grown as a tall hedge[29], they are rather bare in winter though[K]. The wood can be used to make skewers[4].

dwatta Antispasmodic Astringent Birthing aid Homeopathy SedativeGuelder rose is a powerful antispasmodic and is much used in the treatment of asthma, cramps and other conditions such as colic or painful menstruation[254]. It is also used as a sedative remedy for nervous conditions[254]. The bark is antispasmodic, astringent and sedative[4, 9, 46, 165, 213]. The bark contains 'scopoletin', a coumarin that has a sedative effect on the uterus[238]. A tea is used internally to relieve all types of spasms, including

menstrual cramps, spasms after childbirth and threatened miscarriage[9, 222, 238]. It is also used in the treatment of nervous complaints and debility[4, 46, 165, 213]. The bark is harvested in the autumn before the leaves change colour, or in the spring before the leaf buds open. It is dried for later use[238]. The leaves and fruits are antiscorbutic, emetic and laxative[4, 222]. A homeopathic remedy is made from the fresh bark[9]. It is used in the treatment of menstrual pain and spasms after childbirth[9].

nrakta Europe, including Britain, from Scandinavia south and east to Spain, north and west Asia. ksacta Hedges, scrub and woodland, usually on damp soils[3, 13, 17].

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 moist loamy soil in a sunny position[11]. Succeeds in semi-shade but does not grow or fruit so well in such a position[186]. Grows well in heavy clay soils and on chalk[184]. Does not do well on very acid soils. Best if given shade from the early morning sun in spring[200]. A very ornamental plant[1], it is hardy to about -30°C[184] and is often grown in the flower garden. There are many named varieties[184]. Guelder rose regenerates quickly if it is cut to the ground, it can also produce suckers and will often form thickets[186]. The plant is an alternative host for the broad bean aphid[11]. Special Features: Not North American native, Naturalizing, Attractive flowers or blooms. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fleshy. Thick or swollen - fibrous or tap root [2-1].

4.2.81 *Viburnum lantanoides*

Hobbleberry

3 tlin 7 cyuc 3 kcak 0 tcant 1 dwat 3 m hkuc
pcimhmmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflat-prik hpa7tmwatli dyatxre7t hjonli

drutta *Viburnum lantanoides* is a deciduous Shrub growing to 3 m (9ft 10in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to June, and the seeds ripen from 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 and neutral soils and can grow in very acid soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit**Edible Uses:** Fruit - raw or cooked[3, 62, 65]. Sweet and palatable, tasting somewhat like raisins or dates[101, 105, 183]. The fruits have a large seed and a thin flesh[183]. The taste is best after a frost[62, 65]. The ovoid fruit is about 15mm long and contains a single large seed[200].

dwatta Analgesic Blood purifier InfertilityThe leaves are analgesic[257]. They have been mashed and applied to the head as a poultice to ease a migraine[257]. A decoction of the roots has been used as a blood medicine[257]. The decoction has been used as a fertility aid by women[257].

nrakta Eastern N. America - New Brunswick to North Carolina, Ontario, Tennessee and Michigan. ksacta Moist woods and shady ravines[43, 62].

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 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 a shady position[11]. Requires a moist acid soil and woodland conditions but without competition from other plants[11, 184, 200]. Another report says that it requires an exposed position[3]. Dislikes alkaline soils[184]. Best if given shade from the early morning sun in spring[200]. A very hardy plant, tolerating temperatures down to about -30°C[184]. Plants 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]. Plants are often self-layering in the wild and form thickets[184]. This species is closely related to *V. furcatum*[184].

4.2.82 *Rubus allegheniensis*

Alleghany Blackberry, Graves' blackberry
3 tlin 7 cyuc 3 kcak 1 tcan 2 dwat 3 m hkuc
hmimhtut cyutli kyuctup hwicli hrasjlutnyik hpa7tli flatprikliw hpa7tmwatli fyifxre7t hjonli

drutta *Rubus allegheniensis* is a deciduous Shrub growing to 3 m (9ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to July, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Apomictic (reproduce by seeds formed without sexual fusion). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Stem Edible Uses: Fruit - raw, cooked or dried for later use[34, 101, 161, 257]. A pleasant sweet and somewhat spicy flavour[3, 159, 171, 183]. The fruit is about 12mm in diameter[200] and can be 3cm long[235]. Young shoots - raw. They are harvested in the spring, peeled and used in salads[183].

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

dwatta Antihæmorrhoidal Antirheumatic Astringent Diuretic Ophthalmic Stimulant TB Tonic UrinaryThe roots are antihæmorrhoidal, antirheumatic, astringent, stimulant and tonic[257]. An infusion can be used in the treatment of stomach complaints, diarrhoea, piles, coughs and colds, tuberculosis and rheumatism[257]. The infusion has also been used by women threatened with a miscarriage[257]. The root can

be chewed to treat a coated tongue[257]. An infusion of the root has been used as a wash for sore eyes[257]. The leaves are astringent[257]. An infusion can be used in the treatment of diarrhoea[257]. An infusion of the bark has been used in the treatment of urinary problems[257]. A decoction of the stems has been used as a diuretic[257].

nrakta Eastern N. America - Nova Scotia to Ontario, New York, Virginia and North Carolina. ksacta Dry thickets, clearings and woodland margins[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. Cuttings of half-ripe wood, July/August in a frame[200]. Tip layering in July. Plant out in autumn. Division in early spring or just before leaf-fall in the autumn[200].

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

4.2.83 *Berberis georgii*

Barberry
3 tlin 7 cyuc 3 kcak 1 tcan 2 dwat 3 m hkuc
hmimhtut cyutli kyuctup hwicli hyishrasjlutnyikfrp hpa7tli flatprikliw hpa7tmwatli fyifxre7t hjonli

drutta *Berberis georgii* is a deciduous Shrub growing to 3 m (9ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. 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 self-fertile. 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. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[K]. A very acid lemon-like flavour, it is nice in small quantities raw. When cooked it can be used in pies, preserves etc[K]. A very good size for a barberry, the fruit is up to 10mm long and 4mm wide[K]. A refreshing lemon-like drink can be made from the fruit.

tcanta Dye A yellow dye is obtained from the roots, bark and stem.

dwatta Antibacterial Cancer Dysentery Berberine, universally present in rhizomes of *Berberis* species, has marked antibacterial effects. Since it is not appreciably absorbed by the body, it is used orally in the treatment of various enteric infections, especially bacterial dysentery[218]. It should not be used with *Glycyrrhiza* species (Liquorice) because this nullifies the effects of the berberine[218]. Berberine has also shown antitumour activity[218].

nrakta A hybrid of uncertain parentage. ksacta Not known in a truly wild condition.

propta Seed - best sown as soon as it is ripe in a cold frame, when it should germinate in late winter or early spring[78]. Seed from over-ripe fruit will take longer to germinate[78], whilst stored seed may require cold stratification and should be sown in a cold frame as early in the year as possible[80]. The seedlings are subject to damping off, so should be kept well ventilated[113]. When the seedlings are large enough to handle, prick them out into individual pots and grow them on in a cold frame. If growth is sufficient, it

can be possible to plant them out into their permanent positions in the autumn, but generally it is best to leave them in the cold frame for the winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood, July/August in a frame. Cuttings of mature wood of the current season's growth, preferably with a heel, October/November in a frame[78]. Suckers, removed in late autumn/early winter and planted out in situ or potted up and planted out in late spring[200].

nwatta Prefers a warm moist loamy soil but it is by no means fastidious, succeeding in thin, dry and shallow soils[11, 200]. Grows well in heavy clay soils. Succeeds in full sun or light shade[11, 200]. Plants are hardy to about -35°C. This species is a hybrid of unknown origin, probably involving *B. vulgaris*[11]. It is an exceptionally free-fruiting form[184] and is of interest in breeding programmes[K]. This species is probably an alternate host of black-stem rust of wheat. Hybridizes freely with other members of this genus[1]. Plants can be pruned back quite severely, they re-sprout well from the base[200].

4.2.84 *Vaccinium ovalifolium*

Black Huckleberry, Oval-leaf blueberry
3 tlin 7 cyuc 3 kcaak 0 tcan 1 dwat 3 m hkuc
hmimhtut ctytli tcup hwicli hrasjlut hpa7tli frusflat
hpa7tmwtatli xre7t hjonli

drutta *Vaccinium ovalifolium* is a deciduous Shrub growing to 3 m (9ft 10in). See above for USDA hardiness. It is hardy to UK zone 3. 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) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kckaak Edible Parts: FruitEdible Uses: Fruit - raw or cooked[105, 118, 161, 172, 257]. Mildly acidic[11, 200]. A pleasant sweet flavour[212]. The fruit is a reasonable source of vitamin C[257]. The fruit can also be dried for later use[183] when they have a flavour like raisins[256]. The fruit is about 10mm in diameter[200].

dwatta Antiseptic Astringent Birthing aid Carminative Hypoglycaemic Vitamin CAntiseptic, astringent, carminative, hypoglycaemic[172]. An infusion of the leaves and sugar have been given to a mother after childbirth[257].

nrakta Northern N. America - Quebec to Michigan, Oregon and Alaska. ksacta Thickets, open woods and peaty slopes[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]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. The fruit is borne singly rather than in clusters[183]. This species is closely related to *V. parvifolium*[182]. Plants in this genus are notably resistant to honey fungus[200].

4.2.85 *Berberis vulgaris*

European Barberry, Common barberry
3 tlin 7 cyuc 3 kcaak 4 tcan 3 dwat 3 m hkuc

hmimhtut ctytli kyucpaw hwicli hrasjlutnykfrup hpa7tli flatprikliw hpa7tmwtatli fyifxre7t hjonli

drutta *Berberis vulgaris* is a deciduous Shrub growing to 3 m (9ft) by 2 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in leaf from March to November, 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 self-fertile. 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. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Bark in doses of 4 mg or more; stupor, nose-bleeds, vomiting, diarrhoea and kidney irritation. Contra-indicated during pregnancy as abortion risk[301].

kckaak Edible Parts: Fruit LeavesEdible Uses: Condiment TeaFruit - raw or cooked[2, 3, 5, 7, 9, 11, 95, 183]. Rich in vitamin C[268], the fruit has a very acid flavour and is mainly used in preserves[100], though children and some adults seem to like it raw when it is fully ripe[K]. A refreshing lemon-like drink can be made from the fruit[183]. The fruits are about 10mm long[200]. Young leaves - used as a flavouring or as an acid nibble[177, 183]. They can be used in much the same way as sorrel (*Rumex acetosa*)[9]. The dried young leaves and shoot tips make a refreshing tea[9, 183].

tcanta Beads Dye Fuel Hedge Hedge WoodPlants can be grown as a medium-size hedge in exposed positions but they cannot tolerate extreme maritime exposure[75]. They are very tolerant of trimming but can also be left untrimmed if required[K]. A good quality yellow dye is obtained from the roots, bark and stem[4, 13, 46, 100, 244]. As well as being used on cloth, it is also used to stain wood[244]. The unripe fruit is dried and used as beads[106]. Wood - soft, very hard, fine grained, yellow. Used for carving, toothpicks, mosaics etc[13, 46, 61]. It is also used as a fuel[146].

dwatta Antibacterial Antidiarrhoeal Antipruritic Antirheumatic Antiseptic Antispasmodic Appetizer Astringent Cancer Chologogue Diaphoretic Diuretic Dysentery Expectorant Hepatic Homeopathy Laxative Malaria Ophthalmic Purgative Refrigerant Stomachic TB Tonic Vitamin CBarberies have long been used as a herbal remedy for the treatment of a variety of complaints. All parts of the plant can be used though the yellow root bark is the most concentrated source of active ingredients. The plant is mainly used nowadays as a tonic to the gallbladder to improve the flow of bile and ameliorate conditions such as gallbladder pain, gallstones and jaundice[254]. The bark and root bark are antiseptic, astringent, cholagogue, hepatic, purgative, refrigerant, stomachic and tonic[4, 7, 9, 21, 46, 165, 222]. The bark is harvested in the summer and can be dried for storing[4]. It is especially useful in cases of jaundice, general debility and biliousness[4], but should be used with caution[165]. The flowers and the stem bark are antirheumatic[218]. The roots are astringent and antiseptic[222]. They have been pulverized in a little water and used to treat mouth ulcers[213]. A tea of the roots and stems has been used to treat stomach ulcers[213]. The root bark has also been used as a purgative and treatment for diarrhoea[213] and is diaphoretic[222]. A tincture of the root bark has been used in the treatment of rheumatism, sciatica etc[222]. The root bark is a rich source of the alkaloid berberine - about 6%[240]. Berberine, universally present in rhizomes of *Berberis* species, has marked antibacterial effects. Since it is not appreciably absorbed by the body, it is used orally in the treatment of various enteric infections, especially bacterial dysentery[218]. It should not be used with *Glycyrrhiza* species (Licorice) because this nullifies the effects of the berberine[218]. Berberine has also shown antitumour activity[218] and is also effective in the treatment of hypersensitive eyes, inflamed lids and conjunctivitis[244]. A tea made from the fruits is antipruritic, antiseptic, appetizer, astringent, diuretic, expectorant and laxative[7, 222]. It is also used as a febrifuge[213]. The fruit, or freshly pressed juice, is used in the treatment of liver and gall bladder problems, kidney stones, menstrual pains etc[9]. The leaves are astringent and antiscorbutic[7]. A tea made from the leaves is used in the treatment of coughs[222]. The plant (probably the inner bark) is used by homeopaths as a valuable remedy for kidney and liver insufficiency[244]. Other uses include malaria, and opium and morphine with-

drawal[30].
nrakta Barberry Coast. Naturalized, or possibly native, in Britain[17]. ksacta Light deciduous woodland, hedges, roadsides, clearings etc, preferring a sunny position and a chalky soil[9, 268].

propta Seed - best sown as soon as it is ripe in a cold frame, when it should germinate in late winter or early spring[78]. Seed from over-ripe fruit will take longer to germinate[78], whilst stored seed may require cold stratification and should be sown in a cold frame as early in the year as possible[80]. The seedlings are subject to damping off, so should be kept well ventilated[113]. When the seedlings are large enough to handle, prick them out into individual pots and grow them on in a cold frame. If growth is sufficient, it can be possible to plant them out into their permanent positions in the autumn, but generally it is best to leave them in the cold frame for the winter and plant them out in late spring or early summer of the following year. Germination averages out at about 90%[98, 113]. Cuttings of half-ripe wood, July/August in a frame. Cuttings of mature wood of the current season's growth, preferably with a heel, October/November in a frame[78]. Suckers, removed in late autumn/early winter and planted out in situ or potted up and planted out in late spring[3, 200].

nwatta Prefers a warm moist loamy soil but it is by no means fastidious, succeeding in thin, dry and shallow soils[11, 200]. Prefers a light rich rather dry soil according to another report[37]. Grows well in heavy clay soils. Succeeds in full sun or light shade[11, 200] but requires a moist soil when grown in the shade of trees[14]. Hardy to about -35°C[184]. A very ornamental plant[11], the barberry was at one time cultivated for its edible fruit, there are several named varieties[11, 200]. 'Dulcis' the fruit of which is sweet or slightly sour[200]. 'Asperma' is a seedless form that was often used in France to make a jam[182, 183]. An alternate host of 'black-stem rust' of wheat so it has been extensively grubbed up from its habitats[3, 11, 13, 74]. Hybridizes freely with other members of this genus[1], though it usually breeds fairly true to type[80]. Can be pruned back quite severely, it resprouts well from the base[200].

4.2.86 *Pinus pumila*

Dwarf Siberian Pine

3 tlin 7 cyuc 3 kcak 3 tcan 2 dwat 3 m hkuc
htut cyutli hqatkyuctcup hwicli hyishrasjlut hpa7tli flatprik
hpa7tmwatli dyat hjonli

drutta *Pinus pumila* is an evergreen Shrub growing to 3 m (9ft) by 5 m (16ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 1. It is in leaf all year, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].
kcakta Edible Parts: Seed Edible Uses: Condiment Seed - raw or cooked[81, 105, 177]. Rich in oil, it has a slightly resinous flavour and a pleasant soft texture[K]. A reasonable size, the seed is up to 10mm x 7mm[200]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Charcoal Dye Herbicide 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]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4].

Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. The wood is a source of charcoal[46].

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 N.E. Asia - China, Japan, Korea, Mongolia and Siberia. ksacta Often forms extensive thickets in exposed situations or above the tree line[11]. Mountains at elevations of 1000 - 2300 metres in northern China[266].

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

nwatta Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. Very wind resistant[11]. An exceedingly cold-hardy tree, tolerating temperatures down to about -70°C[200]. This species is closely related to *P. cembra*[1]. 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 on the tree, the seed is extracted by breaking up the soft scales of the cone[200]. Leaf secretions inhibit the germination of seeds, thereby reducing the amount of plants that can grow under the trees[18]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. An evergreen. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2].

4.2.87 *Rosa canina*

Dog Rose

3 tlin 7 cyuc 3 kcak 4 tcan 3 dwat 3 m hkuc
hmimhtut cyutli tcuphja7n hwicli hrasjlutnyikfrip hpa7tli flat-
prikwlis hpa7tmwatli fyifxre7t hjonli

drutta *Rosa canina* is a deciduous Shrub growing to 3 m (9ft) by 3 m (9ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June

and the seeds ripen from October to December. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles, Lepidoptera (Moths and Butterflies), Apomictic (reproduce by seeds formed without sexual fusion). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil. The plant can tolerate strong winds but not maritime exposure.

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

kcakta Edible Parts: Flowers Fruit Seed **Edible Uses:** Coffee TeaFruit - raw or cooked[2, 4, 13]. It can be used in making delicious jams, syrups etc[7]. The syrup is used as a nutritional supplement, especially for babies[238]. The fruit can also be dried and used as a tea[9, 12, 183]. Frost softens and sweetens the flesh[12]. The fruit is up to 30mm in diameter[200], but there is only a thin layer of flesh surrounding the many seeds[k]. Some care has to be taken when eating this fruit, see the notes above on known hazards. The seed is a good source of vitamin E[102], it can be ground and mixed with flour or added to other foods as a supplement. Be sure to remove the seed hairs[102]. The dried leaves are used as a tea substitute[46, 61, 183]. A coffee substitute according to another report[7]. Petals - raw or cooked[177]. The base of the petal may be bitter so is best removed[183]. Eaten as a vegetable in China[66]. The petals are also used to make an unusual scented jam[7].

tcanta Hedge Hedge Plants make a dense and stock-proof hedge, especially when trimmed[186].

dwatta Antirheumatic Astringent Bach Cancer Carminative Diuretic Laxative Ophthalmic Tonic Vermifuge Vitamin C The petals, hips and galls are astringent, carminative, diuretic, laxative, ophthalmic and tonic[7, 9, 14, 21, 165]. The hips are taken internally in the treatment of colds, influenza, minor infectious diseases, scurvy, diarrhoea and gastritis[238]. A syrup made from the hips is used as a pleasant flavouring in medicines and is added to cough mixtures[238]. A distilled water made from the plant is slightly astringent and is used as a lotion for delicate skins[7]. The seeds have been used as a vermifuge[7]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Resignation' and 'Apathy'[209]. 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]. Ascorbic acid in Dog Rose shells (vitamin C, 0.2 to 2.4%).

nrakta Europe, including Britain, from Norway south and east to N. Africa and southwest Asia. ksacta Hedges, scrub, woods, roadsides, banks etc[9].

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

cold frame[78, 200]. The cuttings can take 12 months to establish but a high percentage of them normally succeed[78]. Division of suckers in the dormant season. Plant them out direct into their permanent positions. Layering. Takes 12 months[11].

nwatta Succeeds in most soils[11, 200]. Grows well in heavy clay soils. Prefers a circumneutral soil and a sunny position with its roots in the shade[11, 200]. When grown in deep shade it usually fails to flower and fruit[186]. Succeeds in wet soils but dislikes water-logged soils or very dry sites[186]. Tolerates maritime exposure[186]. The fruit attracts many species of birds, several gall wasps and other insects use the plant as a host[186] A very polymorphic species, it is divided into a great number of closely related species by some botanists[1, 17]. The leaves, when bruised, have a delicious fragrance[245]. The flowers are also fragrant. Grows well with alliums, parsley, mignonette and lupins[18, 20]. Garlic planted nearby can help protect the plant from disease and insect predation[18, 20]. Grows badly with boxwood[18]. Hybridizes freely with other members of this genus[80]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.88 *Rubus strigosus*

American Red Raspberry, Grayleaf red raspberry
3 tlin 7 cyuc 3 kcak 1 tcan 3 dwat 2 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli fyifxre7t hjonli

dwatta *Rubus strigosus* is a deciduous Shrub growing to 2 m (6ft 7in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Stem **Edible Uses:** TeaFruit - raw or cooked in pies, preserves etc[1, 2, 3, 34, 85, 101, 183]. Young shoots - harvested as they emerge through the ground in the spring, peeled and eaten raw or cooked like asparagus[85, 101, 161, 183]. The leaves and twigs are used as a tea substitute[161, 183].

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

dwatta Antiemetic Astringent Birthing aid Cardiac Decongestant Oxytoxic Refrigerant Stimulant Antiemetic[13, 165]. The leaves and roots are anti-inflammatory, astringent, decongestant, ophthalmic, oxytoxic and stimulant[4, 13, 165, 222, 254]. A tea made from them is used in the treatment of diarrhoea, as a tonic for the uterus to strengthen pregnant women, and as an aid in childbirth[4, 222, 257]. The tea has also been shown as effective in relieving painful menstrual cramps[222]. The active ingredients both stimulate and relax the uterus[222]. They can be used during the last three months of pregnancy and during childbirth, but should not be used earlier[238]. Externally, the leaves and roots are used as a gargle to treat tonsillitis and mouth inflammations, as a poultice and wash to treat sores, conjunctivitis, minor wounds, burns and varicose ulcers[238, 257]. The leaves are harvested in the summer and dried for later use[9]. The fruit is antiscorbutic and diuretic[7]. Fresh raspberry juice, mixed with a little honey, makes an excellent refrigerant beverage to be taken in the heat of a fever[21]. Made into a syrup, it is said to have a beneficial effect on the heart[21].

nrakta N. America - Newfoundland to British Columbia, south to New Mexico. ksacta Thickets, clearings and woodland borders[204]. In dry or rocky situations[235].

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

nwatta Easily grown in a good well-drained loamy soil in sun or semi-shade[1, 11, 200]. A parent of some of the culti-

vated raspberries[11, 34], it is often used in modern breeding programmes[119]. This species has biennial stems, it produces a number of new stems each year from the perennial rootstock, these stems fruit in their second year and then die[200]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.89 *Vaccinium ovatum*

Evergreen Huckleberry, Florist's Huckleberry, Shot Huckleberry, Californian Huckleberry

3 tlin 7 cyuc 3 kcaok 0 tcan 1 dwat 2.5 m hkuc
hmmihtut cyutli kyuctcup hwicli hrasljut hpa7tli frusflat
hpa7tmwatli xre7t hjonli

drutta *Vaccinium ovatum* is an evergreen Shrub growing to 2.5 m (8ft 2in) at a slow rate. It is frost tender. It is in leaf all year, in flower from April to May, and the seeds ripen from October to December. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) 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. The plant can tolerate maritime exposure.

kcakta Edible Parts: Fruit Edible Uses: Tea Fruit - raw, cooked or dried for later use[3, 101, 105, 118, 183, 257]. Somewhat sweet but slightly dry[183, 256]. The fruit is quite palatable but is nothing special[K]. A strong flavour, they are usually cooked in pies, preserves etc[177, 183]. The fruit will often hang on the bush until early winter[256]. The fruit is about 6mm in diameter[200]. A tea is made from the leaves and dried fruit[101].

dwatta Antiseptic Astringent Birthing aid Carminative Hypoglycaemic The leaves are antiseptic, astringent, carminative and hypoglycaemic[172]. An infusion of the leaves and sugar have been given to a mother after childbirth to help her regain her strength[257]. A decoction of the leaves has been used in the treatment of diabetes[257].

nrakta Western N. America - British Columbia to California. ksacta Dry slopes and sandy heathy places from near the sea to 800 metres[184].

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]. Most species require shelter from strong winds[200], but judging by the native range of this species it might succeed in maritime exposure[K]. Hardy to about -15°C[184]. Plants are sometimes cut back by late frosts[11] A very ornamental plant[60], it is sometimes cultivated for its edible fruit, there are some named varieties[183]. One report says that it does not fruit freely in Britain[11], but a shrub growing in the shade of oak trees at the RHS gardens in Wisley was seen to be heavy with fruit in the autumns of 1987 and 1988[K]. A shade loving plant, growing well in a woodland[182]. Plants in this genus are notably resistant to honey fungus[200]. Dislikes root disturbance, plants are best grown in pots until being

planted out in their permanent positions[200]. Special Features: North American native, Edible, Inconspicuous flowers or blooms.

4.2.90 *Epilobium angustifolium*

Willow Herb

3 tlin 7 cyuc 3 kcaok 2 tcan 2 dwat 2 m hkuc
hmmihtut cyutli kyuctcup hwicli hrasljutnyik hpa7tli flat-
prikliwis hpa7tmwatli xre7t hjonli

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

pcista An infusion of the leaves is said to stupefy a person[4].

kcakta Edible Parts: Flowers Leaves Root Stem Edible Uses: Tea Leaves and young shoot tips - raw or cooked[2, 5, 12, 62, 172, 183]. They can be used in salads or cooked as a vegetable[9]. When boiled they make a wholesome vegetable and are a good source of vitamins A and C[2, 257]. Only use the leaves when they are young[85]. Although they are said to be edible, another report says that an infusion of them can stupefy[4]. Young shoots - cooked. They make a good asparagus substitute[2, 9, 183, 213]. Root - raw, cooked or dried and ground into a powder[74, 172]. Used in spring, it has a sweet taste[12, 74]. Flower stalks - raw or cooked[85, 106, 172, 183]. Added to salads, they are used when the flowers are in bud[183]. The pith of young or older stems - raw or cooked[62, 99, 183]. Slightly sweet, tender and pleasing to eat, though there is not much of it[85, 172]. Gelatinous[161], it can be used as a flavouring in soups[183]. The stems are said to be a good laxative, but are best not eaten on an empty stomach[256]. A tea is made from the dried leaves[9, 62, 85, 94, 183], it is sweet and pleasant[172]. Called 'kaporie' tea in Russia, it contains 10% tannin[222]. The leaves are also used as an adulterant of China tea[2].

tcanta Fibre Stuffing Tinder Weather protection A fibre obtained from the outer stems is used to make cordage[99, 207, 256]. The 'cottony' seed hairs are used as a stuffing material[99, 118] or as a tinder[106, 172]. The powdered inner cortex is applied to the hands and face to give protection from the cold[99, 172, 257].

dwatta Anti-inflammatory Antispasmodic Astringent Demulcent Dysentery Emollient Hypnotic Laxative Poultice Tonic Willow herb is often used as a domestic herbal remedy, though it is little used in conventional herbalism. The herb is antispasmodic, astringent, demulcent, emollient, hypnotic, laxative and tonic[4, 7, 172, 192]. It is used in the treatment of diarrhoea, mucous colitis and irritable bowel syndrome[254]. The plant is used in Germany and Austria to treat prostate problems[254]. A poultice of the leaves is applied to mouth ulcers[222]. An extract of the leaves has anti-inflammatory activity[222]. An ointment made from the leaves has been used to soothe skin problems in children[254]. A tea made from the leaves and roots is a folk remedy for dysentery and abdominal cramps[222]. A poultice made from the peeled roots is applied to burns, skin sores, swellings, boils etc[22, 257].

nrakta Europe, including Britain, temperate Asia and N. America. ksacta Rocky ground, waste areas, woodland edges and gardens[7, 13].

propta Seed - sow early spring in situ or as soon as the seed is ripe[111]. This plant is more than capable of finding its own way into most gardens and does not usually require an invitation. Division in spring or autumn. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta An easily grown plant, it prefers a well-drained but moisture retentive soil in a sunny position[200], though it succeeds in most soils[1]. It prefers a moist soil[111], but also succeeds on dry banks[188]. It is best grown in open

woodland[1]. Plants are hardy to at least -20°C[187]. The rosebay willowherb spreads vigorously by means of a creeping rhizome, and often forms large patches[187]. It is apt to become a weed especially through its seed which is very light and capable of travelling long distances in the wind. It is often one of the first plants to colonize disturbed areas such as scenes of fires[1, 200]. A very ornamental plant[1], it is the floral emblem of the Yukon[172]. A food plant for the caterpillars of several lepidoptera species[24], it is also a good bee plant[74, 94]. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.91 *Rubus parviflorus*

Thimbleberry

3 tlin 7 cyuc 3 kcaak 3 tcan 3 dwat 2.5 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta *Rubus parviflorus* is a deciduous Shrub growing to 2.5 m (8ft) by 2 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower in June, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Fruit Stem Edible Uses: Fruit - raw or cooked[62, 101, 118, 183]. It makes excellent jams and preserves[257]. The fruit can also be dried for later use[183]. A sweet and pleasant flavour[2, 85, 94] though this is not always properly developed in the cooler summers of Britain[11]. The fruit is very seedy[155]. Rich in vitamin C[183]. The hemispherical fruit is about 20mm in diameter[200]. Young shoots - peeled and eaten cooked or raw[2, 85, 101, 118, 172]. The shoots are harvested as they emerge in the spring, and whilst they are still young and tender[161, 183]. They can be cooked like asparagus[257]. The shoots are rich in vitamin C[183]. Flowers - raw[172].

tcanta Dye Lining Soap The leaves are used to line baskets etc for carrying soft fruit or other delicate items[99, 118]. Plants are very vigorous and can be grown as a tall ground cover for large areas[208]. A soap is obtained from the boiled bark[99, 118, 257]. A purple to dull blue dye is obtained from the fruit[168].

dwatta Antiemetic Antiplogistic Appetizer Astringent Blood tonic Dysentery Poulrice Salve Stomachic Tonic Vitamin C Women's complaints The leaves are antiemetic, astringent, blood tonic and stomachic[172, 257]. An infusion is used internally in the treatment of stomach complaints, diarrhoea and dysentery, anaemia, the spitting up of blood and to treat vomiting[238, 257]. An infusion has been taken by women when their periods are unusually long[257]. A poultice of the dried powdered leaves has been used to treat wounds and burns[257]. The leaves have been crushed and rubbed over the skin to treat pimples and blackheads[257]. A poultice of the leaf ashes, mixed with oil, has been used to treat swellings[257]. The young shoots are alternative and antiscorbutic[257]. The roots are appetizer, astringent, stomachic and tonic[172, 257]. An infusion has been used by thin people to help them gain weight[257]. An infusion has also been used in the treatment of stomach disorders, diarrhoea and dysentery[238, 257]. A decoction of the roots has been taken in the treatment of pimples and blackheads[257].

nrakta Western N. America - Alaska to Ontario and California. Occasionally naturalized in Britain[17]. ksacta Woodlands, canyons and open areas[62].

propta Seed - requires stratification, is best sown in early autumn in a cold frame. Sow stored seed as early as possible in the year in a cold frame and stratify for a month at 3°C if sowing later than February. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Tip layering in July. Plant out in autumn. Division in early spring.

nwatta Easily grown in a good well-drained loamy soil in sun or semi-shade[1, 11, 200]. Can be grown in a woodland garden though it is less likely to fruit well in such a position[K]. This plant has perennial stems without prickles[200] and is less invasive than the related *R. odoratus*[182]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.92 *Rubus odoratus*

Thimbleberry, Purpleflowering raspberry

3 tlin 7 cyuc 3 kcaak 3 tcan 2 dwat 2.5 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta *Rubus odoratus* is a deciduous Shrub growing to 2.5 m (8ft) by 2.5 m (8ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to September, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[105, 161, 257]. Somewhat tart and dry[2], it is usually cooked and used in pies, jellies, preserves etc[183]. The fruit can be dried for later use[257]. This species rarely fruits well in Britain, probably due to our cooler summers[11].

tcanta Dye A purple to dull blue dye is obtained from the fruit[168]. Plants are very vigorous and can be grown as a tall ground cover for large areas[208].

dwatta Astringent Diuretic Dysentery Kidney Odontalgic Salve Stomachic The leaves are highly astringent[207]. They are used in the treatment of dysentery and diarrhoea[238]. The leaves have been used as a wash for old and foul sores, boils etc[257]. A decoction or infusion of the branches has been used to settle the stomach[257]. A decoction of the leaves and stems has been used to treat kidney complaints[257]. The root is astringent. A decoction of the root or the root bark has been used as a treatment for diarrhoea and colds[257]. The root has been used in the treatment of toothaches[257]. The berries have been used as a diuretic[257].

nrakta Eastern N. America - Quebec to Ontario and south to Tennessee. Occasionally naturalized in Britain. ksacta Moist thickets and woodland borders[43].

propta Seed - requires stratification, is best sown in early autumn in a cold frame. Sow stored seed as early as possible in the year in a cold frame and stratify for a month at 3°C if sowing later than February. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. Tip layering in July. Plant out in autumn. Division in early spring.

nwatta Easily grown in a good well-drained loamy soil in sun or semi-shade[1, 11, 200]. Grows well in a sandy soil but does not like clay[182]. Prefers a semi-shaded position. Does well in a woodland garden though it is less likely to fruit well in such a position. A very ornamental plant[1], it is hardy to about -30°C[184]. The glandular hairs on the stems have a powerful resinous scent somewhat like cedarwood[245]. A vigorous suckering shrub, it has perennial stems without prickles[200]. Plants in this genus are notably susceptible

tohony 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 suckering with new plants from underground runners away from the plant [1-2].

4.2.93 *Asclepias syriaca*

Common Milkweed, Silkweed, Milkweed
3 thin 8 cyuc 3 kcaac 3 tcan 2 dwat 1 m hkuc
hmmihmtut cyutli kyuctpoc hwicli hrasjlt hpa7tli flatprikjlwis
hpa7tmmwatli xre7t hjonli

drutta Asclepias syriaca is a PERENNIAL growing to 1 m (3ft 3in) by 1 m (3ft 3in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to August, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects, Lepidoptera (Moths and Butterflies). It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Although no specific reports have been seen for this species, many, if not all, members of this genus contain toxic resinoids, alkaloids and cardiac glycosides[274]. They are usually avoided by grazing animals[274]. The older leaves are poisonous if eaten in large quantities[20, 21]. The plant contains cardioactive compounds and is potentially toxic[222].

kcakta Edible Parts: Flowers Leaves Oil Oil Seed Seedpod
Edible Uses: Gum Oil Oil Sweetener Unopened flower buds - cooked. They taste somewhat like peas. They are used like broccoli[183]. Flowers and young flower buds - cooked. They have a mucilaginous texture and a pleasant flavour, they can be used as a flavouring and a thickener in soups etc[55, 102, 257]. The flower clusters can be boiled down to make a sugary syrup[2, 85]. The flowers are harvested in the early morning with the dew still on them[95]. When boiled up they make a brown sugar[95]. Young shoots - cooked. An asparagus substitute[2, 4, 43, 55, 62, 95, 183]. They should be used when less than 20cm tall[159]. A slightly bitter taste[159]. Tips of older shoots are cooked like spinach[85, 183]. Young seed pods, 3 - 4 cm long, cooked[2, 43, 55, 85]. They are very appetizing. Best used when about 2 - 4cm long and before the seed floss forms, on older pods remove any seed floss before cooking them[85, 159]. If picked at the right time, the pods resemble okra[183]. The sprouted seeds can be eaten[183]. An edible oil is obtained from the seed[55, 171]. The latex in the stems is a suitable replacement for chicle and can be made into a chewing gum[46, 61, 269]. It is not really suitable for use in tyres[269]. The latex is found mainly in the leaves and is destroyed by frost[112]. Yields are higher on dry soils[112].

tcanta Adhesive Fibre Gum Latex Oil Oil Pollution Stuffing Wick
A good quality fibre is obtained from the inner bark of the stems. It is long and quite strong, but brittle[269]. It can be used in making twine, cloth, paper etc[95, 112, 169]. The fibre is of poor quality in wet seasons[112]. It is easily harvested in late autumn after the plant has died down by simply pulling the fibres off the dried stems[169]. It is estimated that yields of 1,356 kilos per hectare could be obtained from wild plants[269]. The seed floss is used to stuff pillows etc or is mixed with other fibres to make cloth[112, 159, 169, 171]. It is a Kapok substitute, used in Life Jackets or as a stuffing material[112]. Very water repellent, it can yield up to 550 kilos per hectare[112]. The floss absorbs oil whilst repelling water and so has also been used to mop up oil spills at sea. Candlewicks can be made from the seed floss[112,

207]. In cultivation, only 1 - 3% of the flowers produce mature pods[269]. It is estimated that yields of 1,368 kilos per hectare could be obtained from wild plants[269]. Rubber can be made from latex contained in the leaves and the stems[46, 57, 102, 159]. It is found mainly in the leaves and is destroyed by frost[112]. Yields of 197 kilos per hectare can be expected from wild plants, it is estimated that by selection these yields could be increased to 897 kilos[269]. Yields are higher on dry soils[112]. The latex can also be used as a glue for fixing precious stones into necklaces, earrings etc[257]. The latex contains 0.1 - 1.5% caoutchouc, 16 - 17% dry matter, and 1.23% ash. It also contains the digitalis-like mixture of a- and b-asclepiadin, the antitumor b-sitosterol, and a- and b-amyrin and its acetate, dextrose and wax[269]. Pods contain an oil and a wax which are of potential importance. The seed contains up to 20% of an edible semi-drying oil[7, 112]. It is also used in making liquid soap[74]. The dogbane-milkweed family *Asclepias*, *Apocynum*, *Calotropis*, and *Trachomitum* spp) has been used for fiber industrial crops for millennia with a number in cultivation as regional crops. All of these crops are dual-purpose fibres, offering bast fibres from the stem and seed finer or 'floss' in the fruit pods. Many have also been identified as potential hydrocarbon crops due to high latex content. Could be integrated into various agroforestry systems rather than as monocultures [1-1].

dwatta Anodyne Contraceptive Diaphoretic Diuretic Emetic Expectorant Homeopathic Purgative Warts
The root is anodyne, diaphoretic, diuretic, emetic, expectorant and purgative[4, 21, 222]. It has been used in the treatment of asthma, kidney stones, venereal disease etc[254, 257]. Caution is advised, see the notes above on toxicity. An infusion of the pounded roots has been used by the women of some native North American Indian tribes to promote temporary sterility[213, 257]. The leaves and/or the latex are used in folk remedies for treating cancer and tumours[269]. The milky latex from the stems and leaves is used in the treatment of warts[4, 159, 222, 257]. The latex needs to be applied at least daily over a period of up to a few weeks to be effective. The stems can be cooked and applied as a poultice on rheumatic joints[257]. One reported Mohawk antifertility concoction contained milkweed and jack-in-the-pulpit, both considered contraceptive. Dried and pulverized, a fistful of milkweed and three *Arisaema* rhizomes were infused in a pint of water for 20 minutes. The infusion was drunk, a cupful an hour, to induce temporary sterility[269]. The rhizome is used in homeopathy as an antioedemic and emmenagogue in the treatment of dropsy and dysmenorrhoea[269].

nrakta Eastern N. America - New Brunswick to Saskatchewan, south to N. Carolina, Kansas and Georgia. ks-acta Thickets, roadsides, dry fields and waste places[21, 43].

propta Seed - best sown in a greenhouse as soon as it is ripe in the autumn or in late winter[134, 169]. We have also had good results from sowing the seed in the greenhouse in early spring[K], though stored seed might need 2 - 3 weeks cold stratification[134]. Germination usually takes place in 1 - 3 months at 18°C[134]. As soon as the seedlings are large enough to handle, prick them out into individual pots and grow them on in the greenhouse for their first winter. Plant out when they are in active growth in late spring or early summer and give them some protection from slugs until they are growing away strongly. Division in spring. With great care since the plant resents root disturbance. Pot the divisions up and place them in a lightly shaded position in the greenhouse until they are growing away strongly, then plant them out in the summer, giving them some protection from slugs until they are established.. Basal cuttings in late spring. Use shoots about 10cm long with as much of their white underground stem as possible. Pot them up individually and place them in a lightly shaded position in a greenhouse until they are rooting and growing actively. If the plants grow sufficiently, they can be put into their permanent positions in the summer, otherwise keep them in the greenhouse until the following spring and when they are in active growth plant them out into their permanent positions. Give them some protection from slugs until they are established.

nwatta Experimental Crop Industrial Crop:
Fiber Industrial Crop: Hydrocarbon Management: Hay-
Succeeds in any good soil[187]. Prefers a well-drained light rich or peaty soil[1, 200]. Requires a moist peaty soil and a sunny position[111, 134]. Plants are hardy to about -25°C[187]. A very ornamental plant[1], though it can be invasive by means of its spreading root system[200]. The

ing paper, the stems can be retted by leaving them in the ground until they are dry in the winter or they can be harvested in late summer, the leaves removed and the stems steamed to remove the fibre[189]. The stems are then cooked for two hours with lye and pounded with mallets[189]. The paper colour varies from white to creamy green depending on how the paper is made[189]. If the stems are used in the summer the latex will often find its way onto the fibres and is hard to remove[189]. The seed floss is used to stuff pillows etc or is mixed with other fibres to make cloth[168, 169]. It is a Kapok substitute, used in Life Jackets or as a stuffing material[169]. It is very water repellent. The floss has also been used to mop up oil spills at sea. Rubber can be made from latex contained in the leaves and the stems[57, 92, 112]. The yield is up to 3%[112]. Pods contain an oil and a wax which are of potential importance. A green dye is obtained from the flowers and leaves combined[168].

dwatta Contraceptive WartsThe following uses have been recorded for *A. speciosa*, it is fairly safe to assume they can also be applied to this closely related species[K]. The latex is used as a cure for warts[168]. A tea made from the whole plant has been used as a contraceptive after childbirth[213].

nrakta Western N. America - Wyoming to Colorado, south to Nevada and S. Arizona. ksacta Sandy soils of prairies and roadsides[228].

propta Seed - best sown in a greenhouse as soon as it is ripe in the autumn or in late winter[134, 169]. We have also had good results from sowing the seed in the greenhouse in early spring[K], though stored seed might need 2 - 3 weeks cold stratification[134]. Germination usually takes place in 1 - 3 months at 18°C[134]. As soon as the seedlings are large enough to handle, prick them out into individual pots and grow them on in the greenhouse for their first winter. Plant out when they are in active growth in late spring or early summer and give them some protection from slugs until they are growing away strongly. Division in spring. With great care since the plant resents root disturbance. Pot the divisions up and place them in a lightly shaded position in the greenhouse until they are growing away strongly, then plant them out in the summer, giving them some protection from slugs until they are established. Basal cuttings in late spring. Use shoots about 10cm long with as much of their white underground stem as possible. Pot them up individually and place them in a lightly shaded position in a greenhouse until they are rooting and growing actively. If the plants grow sufficiently, they can be put into their permanent positions in the summer, otherwise keep them in the greenhouse until the following spring and when they are in active growth plant them out into their permanent positions. Give them some protection from slugs until they are established.

pnwatta Prefers a well-drained light rich or peaty soil and a sunny position[1, 134, 200]. This species is closely related to *A. purpurascens*[200]. Many members of this genus seem to be particularly prone to damage by slugs. The young growth in spring is especially vulnerable, but older growth is also attacked and even well-established plants have been destroyed in wet years[K]. Plants resent root disturbance and are best planted into their final positions whilst small[134]. The flower of many members of this genus can trap insects between its anther cells, the struggles of the insect in escaping ensure the pollination of the plant[207].

4.2.94 *Asclepias hallii*

Purple Silkweed, Hall's milkweed
 3 tlin 7 cyuc 3 kcaok 0 tcan 1 dwat 1 m hkuc
 hmimhtut cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikwlis
 hpa7tmwatli fyifxre7t hjonli
 drutta *Asclepias hallii* 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 3. It is in flower from June to August, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Although no specific reports have been seen for this species, many, if not all, members of this genus contain toxic resinoids, alkaloids and cardiac glycosides[274]. They are usually avoided by grazing animals[274].

kcakta Edible Parts: Flowers Leaves Oil Seed Seed-pod
 Edible Uses: Gum Oil SweetenerThe following uses have been recorded for *A. speciosa*, it is fairly safe to assume they can also be applied to this closely related species[K]. Flower buds - raw or cooked[61, 92]. Tasting somewhat like peas[85]. Young shoots and leaves - cooked[46, 61, 62, 92, 95]. An asparagus substitute[85, 183]. They should not be eaten raw[85]. Tips of older shoots are cooked like spinach[85, 183]. Young seed pods, 3 - 4 cm long, cooked. Very appetizing[85]. Flower clusters can be boiled down to make a sugary syrup[85] or they can be eaten raw[161, 183]. Seed - raw[161]. A chewing gum can be made from the latex contained in the stem and leaves[46, 61, 92, 183]. Root[183]. No further details.

tcanta Dye Fibre Gum Latex Oil Paper Pollution StuffingThe following uses have been recorded for *A. speciosa*, it is fairly safe to assume they can also be applied to this closely related species[K]. A good quality tough fibre is obtained from the bark[92, 99]. It is used in twine, coarse cloth, paper etc[92, 99]. The fibre is 10 - 45mm long[189]. It is easily harvested in late autumn, after the plants have died down, by simply pulling it off the dead stems[168, 169]. When mak-

ing paper, the stems can be retted by leaving them in the ground until they are dry in the winter or they can be harvested in late summer, the leaves removed and the stems steamed to remove the fibre[189]. The stems are then cooked for two hours with lye and pounded with mallets[189]. The paper colour varies from white to creamy green depending on how the paper is made[189]. If the stems are used in the summer the latex will often find its way onto the fibres and is hard to remove[189]. The seed floss is used to stuff pillows etc or is mixed with other fibres to make cloth[168, 169]. It is a Kapok substitute, used in Life Jackets or as a stuffing material[169]. It is very water repellent. The floss has also been used to mop up oil spills at sea. Rubber can be made from latex contained in the leaves and the stems[57, 92, 112]. The yield is up to 3%[112]. Pods contain an oil and a wax which are of potential importance. A green dye is obtained from the flowers and leaves combined[168].

dwatta Contraceptive WartsThe following uses have been recorded for *A. speciosa*, it is fairly safe to assume they can also be applied to this closely related species[K]. The latex is used as a cure for warts[168]. A tea made from the whole plant has been used as a contraceptive after childbirth[213].

nrakta Western N. America - Wyoming to Colorado, south to Nevada and S. Arizona. ksacta Sandy soils of prairies and roadsides[228].

propta Seed - best sown in a greenhouse as soon as it is ripe in the autumn or in late winter[134, 169]. We have also had good results from sowing the seed in the greenhouse in early spring[K], though stored seed might need 2 - 3 weeks cold stratification[134]. Germination usually takes place in 1 - 3 months at 18°C[134]. As soon as the seedlings are large enough to handle, prick them out into individual pots and grow them on in the greenhouse for their first winter. Plant out when they are in active growth in late spring or early summer and give them some protection from slugs until they are growing away strongly. Division in spring. With great care since the plant resents root disturbance. Pot the divisions up and place them in a lightly shaded position in the greenhouse until they are growing away strongly, then plant them out in the summer, giving them some protection from slugs until they are established. Basal cuttings in late spring. Use shoots about 10cm long with as much of their white underground stem as possible. Pot them up individually and place them in a lightly shaded position in a greenhouse until they are rooting and growing actively. If the plants grow sufficiently, they can be put into their permanent positions in the summer, otherwise keep them in the greenhouse until the following spring and when they are in active growth plant them out into their permanent positions. Give them some protection from slugs until they are established.

pnwatta Prefers a well-drained light rich or peaty soil and a sunny position[1, 134, 200]. This species is closely related to *A. purpurascens*[200]. Many members of this genus seem to be particularly prone to damage by slugs. The young growth in spring is especially vulnerable, but older growth is also attacked and even well-established plants have been destroyed in wet years[K]. Plants resent root disturbance and are best planted into their final positions whilst small[134]. The flower of many members of this genus can trap insects between its anther cells, the struggles of the insect in escaping ensure the pollination of the plant[207].

4.2.95 *Aronia melanocarpa*

Black Chokeberry, Black Berried Aronia
 3 tlin 8 cyuc 3 kcaok 2 tcan 1 dwat m hkuc
 hmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Aronia melanocarpa* is a deciduous Shrub growing to 2.5 m (8ft) by 3 m (9ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from July to August, and the seeds ripen from October to December. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: FruitEdible Uses: Pectin Pectin-Fruit - cooked. A good flavour but very astringent[183]. The

fruit should be fully ripe before being eaten and is best after a frost or two[K]. It makes a good jelly when sugar is added and is also dried and used for making pemmican[183]. The fruit is rich in pectin and can be added to fruits that are low in this substance when making jams etc[183]. Pectin is also said to protect the body against radiation[201]. The fruit is about 9mm in diameter[200].

tcanta Miscellany Pectin Pectin The fruit is a source of pectin[183], a substance that is used to thicken jams etc and as a culture medium in laboratories.

dwatta Miscellany An infusion of the berries has been used in the treatment of colds[257].

nrakta Eastern N. America - Nova Scotia to Ontario, south to Florida and Michigan. **ksacta** Swamps and low woodlands, it is sometimes also found in drier soils[200, 235].

propta Seed - best sown as soon as it is ripe in pots outdoors or in a cold frame[113]. Pre-soak stored seed overnight and then cold stratify for 3 months at 2°C[113]. The seed germinates in 1 - 3 months at 15°C[134]. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for their first winter. Plant out in late spring. Cuttings of half-ripe wood, July/August in a frame[113]. Division of suckers in the dormant season[200]. Very easy, they can be planted straight out into their permanent positions. Layering[200].

nwatta Landscape Uses: Screen, Specimen. Prefers a moist peaty soil in full sun or partial shade[200]. Succeeds in most soils but dislikes shallow chalk[200]. More tolerant of dry soils than other members of this genus[200]. Plants are hardy to about -25°C. There is at least one cultivar developed for its improved fruit. 'Nero' has fruits twice the size of the species with a vitamin C content of 15 - 30 mg (per 100g?). The fruit is borne in clusters of about 15, it is more flavourful and the yield is about twice that of wild forms[183]. Other cultivars developed mainly for their ornamental value include 'Viking' with extra large berries and 'Aron' with numerous large berries[182]. The sub-species *A. melanocarpa elata* Rehd. and *A. melanocarpa grandifolia* (Lindl.) Schneid. are more vigorous than the type species with larger flowers and fruits[200]. This genus is closely related to *Sorbus* species[200]. Plants in this genus are notably resistant to honey fungus[200]. **Special Features:** Attracts birds, North American native, Naturalizing, Wetlands plant, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A clumping plant, forming a colony from shoots away from the crown but with a limited spread [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.96 *Mertensia maritima*

Oyster Plant

3 tlin 7 cyuc 3 kcak 0 tcan 0 dwat m hkuc
htut cyutli kyucup hwicli hyishrasljut hpa7tli flatprikrlwis hpa7tmwatli fyfekre7t hjonli

drutta *Mertensia maritima* is a PERENNIAL growing to 0.2 m (0ft 8in) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects? Self. The plant is self-fertile. (Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate maritime exposure.

ksakta Edible Parts: Flowers Leaves Seed Edible Uses: Leaves - raw or cooked[172, 183]. They are said to taste of oysters[5]. No-one has yet noticed a resemblance to oysters though not many of the tasters have ever eaten oysters! The flavour is fairly bland, the leaf is thick and has a very mucilaginous texture - it is probably this texture that reminds people of oysters[K]. Root[22, 46, 61, 105]. Eaten by the Inuit of Alaska[183, 257]. Flowers - raw[172].

nrakta Throughout the temperate regions of both hemispheres, including Britain. **ksacta** Shingle by the sea[17]. Uncommon and declining[200].

propta Seed - sow as soon as it is ripe in a cold frame. Spring sown seed is also successful[K]. Germination usually takes place within a month. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Division in April or early September. With care since the plant resents root disturbance.

nwatta Thrives in nutritionally poor sandy or gravelly soils in a sunny position[200]. Requires a very well-drained soil[188]. Dislikes shade[233]. Plants are resentful of root disturbance and should be planted out into their permanent positions as soon as possible[200]. This species is not very easy to cultivate[1]. Plants are very susceptible to slug damage[188, K] The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

4.2.97 *Prunus tomentosa*

Nanking Cherry

3 tlin 9 cyuc 3 kcak 2 tcan 1 dwat 1.5 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikrlwis hpa7tmwatli xre7t hjonli

drutta *Prunus tomentosa* is a deciduous Shrub growing to 1.5 m (5ft) by 2 m (6ft). See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from March to April, 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), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

ksakta Edible Parts: Fruit Leaves Seed Edible Uses: Fruit - raw or cooked[2, 105]. Juicy, sub-acid to sweet[22, 46, 61, 183]. The unripe fruits can be pickled[177, 183]. The fruit is about 12mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity. The buds are cooked and eaten[183]. (Is this the flower or leaf buds?)

tcanta Dye A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from

rocky [168]. An excellent windbreak hedgerow. Plants produce suckers freely. A true bush cherry, easy to protect fruit from predated birds. Partially Self-Pollinating/Self-Fertile - will produce better fruit in terms of yields and quantity when planted with other varieties of Nanking Cherries. Flowers: Beautiful pinkish - white fragrant flowers attract a lot of beneficial insects.

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

nrakta E. Asia - N. and W. China to the Himalayas. ksacta Slopes and in ravines, 1700 - 2400 metres in the Himalayas[145]. Forest on mountain slopes, forest margins, thickets and meadows at elevations of 100 - 3700 metres[266].

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

nwatta Thrives in a well-drained moisture-retentive loamy soil, growing well on limestone[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Grows well in partial shade[31], though it fruits better when in a sunny position[11, 200]. Requires a sheltered position[11]. Thrives in hot summers[188]. Cultivated in Asia for its edible fruits, there are some named varieties[58, 183]. The fruits are not freely borne in Britain[11]. The flowers are produced on the previous years growth[182]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 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 a tap root similar to a carrot going directly down [1-2].

4.2.98 *Lonicera villosa*

Mountain fly honeysuckle, Fuller's honeysuckle
3 tlin 9 cyuc 3 kcak 0 tcan 0 dwat 1.5 m hkuc
htut cyutli tcup hwicli hrasjltunyk hpa7tli flatprikllwis
hpa7tmwattli xre7t hjonli

drutta *Lonicera villosa* is a deciduous Shrub growing to 1.5 m (5ft) at a slow rate. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or preserved[43, 105, 200]. A milder flavour than most edible honeysuckles, they can be eaten raw but are mainly used in making jams, jellies and refreshing drinks[183]. There is a distinct bitterness in the flavour, even when fully ripe[K].

nrakta N. America - Newfoundland to Alaska, south to Pennsylvania, Wisconsin and California. ksacta Peaty or

rocky barrens, bogs and bushy places[43], especially on limestone.

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

nwatta Prefers a good moist soil in a sunny position, fruiting less well when grown in the shade[200]. Closely related to *L. caerulea*[200]. Polymorphic. 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].

4.2.99 *Symphytum officinale*

Comfrey, Common comfrey

3 tlin 10 cyuc 3 kcak 4 tcan 5 dwat 1.2 m hkuc
hmimhtut cyutli tcup hwicli hrasjltunykfrip hpa7tli flatprikllwis hpa7tmwattli xre7t hjonli

drutta *Symphytum officinale* is a PERENNIAL growing to 1.2 m (4ft) by 0.6 m (2ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to June, and the seeds ripen from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista This plant contains small quantities of a toxic alkaloid which can have a cumulative effect upon the liver. Largest concentrations are found in the roots, leaves contain higher quantities of the alkaloid as they grow older and young leaves contain almost none. Most people would have to consume very large quantities of the plant in order to do any harm, though anyone with liver problems should obviously be more cautious. In general, the health-promoting properties of the plant probably far outweigh any possible disbenefits, especially if only the younger leaves are used. Use topically on unbroken skin. May cause loss of appetite, abdominal pain, vomiting. Do not use with Eucalyptus. Do not combine with herbs containing pyrrolizidine alkaloids (e.g. agrimony, alpine ragwort, help, tansy ragwort) [301].

kcakta Edible Parts: Leaves Edible Uses: Gum Tea Young leaves - cooked or raw[2, 4, 5, 9, 46, 61]. The leaf is hairy and the texture is mucilaginous. It may be full of minerals but it is not pleasant eating for most tastes. It can be chopped up finely and added to salads, in this way the hairiness is not so obvious[183, K]. Young shoots can be used as an asparagus substitute[46]. The blanched stalks are used[183]. Older leaves can be dried and used as a tea[26]. The peeled roots are cut up and added to soups[183]. A tea is made from the dried leaves and roots[183]. The roasted roots are used with dandelion and chicory roots for making coffee[183].

tcanta Biomass Compost Gum The plant grows very quickly, producing a lot of bulk. It is tolerant of being cut several times a year and can be used to provide 'instant compost' for crops such as potatoes. Simply layer the wilted leaves at the bottom of the potato trench or apply them as a mulch in no-dig gardens. A liquid feed can be obtained by soaking the leaves in a small amount of water for a week, excellent for potassium demanding crops such as tomatoes. The leaves are also a very valuable addition to the compost heap[26, 200]. A gum obtained from the roots was at one time used in the treatment of wool before it was spun[100]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Anodyne Antidiarrhoeal Antirheumatic Astringent Demulcent Eczema Emollient Expectorant Haemostatic Homeopathy Refrigerant Vulnerary Comfrey is a commonly

used herbal medicine with a long and proven history in the treatment of various complaints. The root and the leaves are used, the root being more active, and they can be taken internally or used externally as a poultice[4, 222]. Comfrey is especially useful in the external treatment of cuts, bruises, sprains, sores, eczema, varicose veins, broken bones etc, internally it is used in the treatment of a wide range of pulmonary complaints, internal bleeding etc[4, 238, K]. The plant contains a substance called 'allantoin', a cell proliferant that speeds up the healing process[4, 21, 26, 165, 222, 238]. This substance is now synthesized in the pharmaceutical industry and used in healing creams[238]. The root and leaves are anodyne, astringent (mild), demulcent, emollient, expectorant, haemostatic, refrigerant, vulnerary[4, 21, 26, 165, 222]. Some caution is advised, however, especially in the internal use of the herb. External applications and internally taken teas or tinctures of the leaves are considered to be completely safe, but internal applications of tablets or capsules are felt to have too many drawbacks for safe usage[238]. See also the notes above on toxicity. The leaves are harvested in early summer before the plant flowers, the roots are harvested in the autumn. Both are dried for later use[238]. A homeopathic remedy is made from the fresh root, harvested before the plant flowers[232]. This has a very limited range of application, but is of great benefit in the treatment of broken bones and eye injuries[232]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Symphythum officinale* for blunt injuries (see [302] for critics of commission E).

nrakta Europe, including Britain, south and east from Scandinavia to Spain, Siberia and Turkey. ksacta Damp, often shady localities, in meadows, woods etc, especially near streams and rivers[9, 17, 244].

propta Seed - sow spring or autumn in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. If you have sufficient seed you can try an outdoor sowing in situ in the spring. Division succeeds at almost any time of the year. Simply use a spade to chop off the top 7cm of root just below the soil level. The original root will regrow and you will have a number of root tops, each of which will make a new plant. These can either be potted up or planted out straight into their permanent positions.

nwatta Landscape Uses:Border, Ground cover, Specimen. Tolerates most soils and situations but prefers a moist soil and some shade[1, 4]. Grows well in heavy clay soils. Best growing in an open sunny site in a deep rich soil if it is being grown for compost material[200]. Plants can be invasive, often spreading freely by means of self-sown seed. The root system is very deep and difficult to eradicate, even small fragments of root left in the soil can produce new plants. Special Features:Attractive foliage, Edible, Fragrant foliage, Not North American native, Invasive, Naturalizing. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is fleshy. Thick or swollen - fibrous or tap root [1-2].

4.2.100 *Prunus cerasus frutescens*

Bush Sour Cherry

3 tlin 7 cyuc 3 kcak 3 tcan 1 dwat 1 m hkuc
hmmihtut cyutli tcup hwicli hrasljutnyik hpa7tli frusflatprik-
wis hpa7tmwatli fyifxre7t hjonli

druta *Prunus cerasus frutescens* is a deciduous Tree growing to 1 m (3ft 3in). See above for USDA hardiness. It

is hardy to UK zone 3. It is in flower in May, and the seeds ripen in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

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

kcakta Edible Parts: Fruit Oil Oil Seed Edible Uses: Gum Gum Oil Oil Tea Fruit - raw or cooked[1, 2, 5, 11, 12]. Neither bitter nor sweet, the fruit is pleasantly acid and can be eaten out of hand, used in pies, preserves etc or dried for later use[183]. The fruit is about 10mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity. An edible oil is obtained from the seed[46, 61]. When refined it is used as a salad oil[183]. The leaves are used as a tea substitute[46, 61, 183]. A gum obtained from the trunk is used for chewing[61, 64].

tcanta Adhesive Dye Gum Gum Hedge Hedge Oil Oil Wood An edible drying oil obtained from the seed is also used in cosmetics[61]. The gum obtained from the stem is also used as an adhesive[61, 64]. Plants can be grown as a hedge[50], succeeding in fairly exposed positions[K]. A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168].

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

nrakta S.E. Europe to W. Asia. ksacta Not known in the wild[11].

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

nwatta Thrives in a well-drained moisture-retentive loamy soil[11, 200]. Prefers some lime in the soil but is likely to become chlorotic if too much lime is present[1]. Prefers an acid soil according to another report[5]. Succeeds in sun or partial shade though it fruits better in a sunny position[11, 200]. Hardy to about -20°C[184]. A shrub with a suckering habit, this subspecies has long been cultivated for its edible fruit, especially in Russia[11]. There are several named varieties[200] including 'Ostheim' which has been cultivated in Britain[11]. This subspecies has smaller fruits[200]. Most members of this genus are shallow-rooted[238]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2].

4.2.101 Cleome serrulata

Rocky Mountain Beeplant

3 tlin 8 cyuc 3 kcaok 2 tcan 1 dwat 1 m hkuc
hmmihtut cyutli kyuctup hwicli hrasjlut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Cleome serrulata is a ANNUAL growing to 1 m (3ft 3in). See above for USDA hardness. It is hardy to UK zone 4 and is frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. 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 can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Flowers Leaves Seed SeedpodEdible Uses: Young shoots, leaves and flowers are cooked and used as potherbs[46, 105, 161, 183]. The plants were gathered and, after removing an alkaline taste[46], were eaten with cornmeal porridge[61, 183]. The plant smells like a skunk, but it was an important potherb for the native North American Indians and the early European settlers in America[207]. Seed - raw or cooked[257]. It can be dried and ground into a meal then used as a mush or mixed with flour to make bread etc[85, 183, 207, 257]. Seedpods - cooked[183]. The hardened cakes of dyestuff (see note on the plants other uses) can be soaked in hot water and then eaten fried[207].

tcanta Deodorant DyeA black dye is obtained[46, 61, 85] by boiling down the whole plant[95]. It is used as a paint for decorating pottery[207]. The young plants are harvested in mid-summer, boiled well in water, the woody parts of the plant are removed and the decoction is boiled again until it becomes thick and turns black. This thick liquid is then poured onto a board to dry in cakes and can be kept for an indefinite period. When needed it is soaked in hot water until the correct consistency for paint is achieved[207]. A decoction of the leaves has been used as a body and shoe deodorant[257].

dwatta Deodorant FebrifugeAn infusion of the plant is drunk in the treatment of fevers and stomach disorders[213, 257]. A poultice made from the pounded, soaked leaves has been applied to sore eyes[257].

nrakta Western N. America - Washington to Saskatchewan and south to California.. ksacta Waste land, plains and lower mountains[60], often on sandy soils[85].

propta Seed - surface sow or only lightly cover the seed in spring in a greenhouse[164]. The seed usually germinates in 5 - 14 days at 25°C[164]. When large enough to handle, prick the seedlings out into individual pots and plant them out in late spring. Day time temperatures below 20°C depress germination but a night time fall to 20° is necessary[164].

nwatta Prefers a light fertile soil in a warm dry sunny position with plenty of room to spread[200]. A frost tender plant, it can be grown as a summer annual in Britain[200]. A very good bee plant, it is often planted by apiarists in America[207]. This plant was probably cultivated by the N. American Indians[85]. The Indians would allow the plant to produce seed when it was growing wild in the cornfields in order to ensure a supply the following year[216].

4.2.102 Amaranthus tricolor

Chinese Spinach, Joseph's-coat, Fountain Plant, Tampala , Summer Poinsettia

3 tlin 11 cyuc 3 kcaok 2 tcan 1 dwat 1 m hkuc
htut cyutli hgattcup hwicli hyishrasjlutnyik hpa7tli frusflatprikwlis hpa7tmwatli fyif hjonli

drutta Amaranthus tricolor is a ANNUAL growing to 1 m (3ft 3in) by 0.5 m (1ft 8in) at a medium rate. See above for USDA hardness. It is hardy to UK zone 4 and is not frost tender. It is in leaf from April to October, in flower from June to August, and the seeds ripen from July to September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought.

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

kcakta Edible Parts: Leaves Seed StemEdible Uses: Leaves - raw or cooked. Often used at the young seedling stage[2, 46, 61], they are also cooked as a spinach and have a very mild flavour[183]. An excellent hot weather substitute for spinach[183]. The leaves contain about 3.5% protein, 0.25% fat, 6.6% carbohydrate, 3.1% ash, 24mg iron per 100g, 464mg calcium per 100g, they are rich in vitamin A and have a fair content of vitamins B1 and C[179]. On a zero moisture basis 100g of the leaves contains up to 2441mg calcium, 1008mg phosphorus, 51mg iron, 34mg sodium, 4475mg potassium, 37,623 micrograms beta-carotene equivalent, 0.68mg thiamine, 2.37mg riboflavin, 11.48mg niacin and 730mg ascorbic acid[218]. The crisp interior of large stems makes a tasty vegetable[183]. It can be eaten raw or cooked as an asparagus substitute[2, 61]. Seed - cooked[22, 177]. Very small, about 1mm in diameter[266], but easy to harvest and very nutritious. The seed can be cooked whole, and becomes very gelatinous like this, but it is rather difficult to crush all of the small seeds in the mouth and thus some of the seed will pass right through the digestive system without being assimilated[K]. The seed contains saponins[218]. If this is the case it is probably best to either soak the seed for at least 12 hours and then rinse thoroughly before cooking or to give the seed a long slow cooking in order to destroy the saponins[K].

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

dwatta AstringentThe whole plant is astringent[240]. A decoction of the root is used with Cucurbita moschata to control haemorrhage following abortion[218]. A decoction of very old plants is taken internally to improve vision and strengthen the liver.

nrakta Tropical Asia ksacta A widely cultivated plant, it is not known in a truly wild situation.

propta Seed - sow late spring in situ. An earlier sowing can be made in a greenhouse and the plants put out after the last expected frosts. Germination is usually rapid and good if the soil is warm[133]. A minimum soil temperature of 10°C is required for germination, germination is better at temperatures above 20°C[206]. A drop in temperature overnight aids germination[133]. Cuttings of growing plants root easily[206].

nwatta Landscape Uses:Border, Container, Foundation, Specimen. Prefers a light well-drained fertile soil in a sunny position[200, 206], though it does succeed in heavier soils[206]. Tolerates fairly acid soils[206]. Tolerates a pH in the range 4.3 to 7.8. This is basically a tropical plant and so requires a hot sheltered position in temperate climates if it is to do well[206, K]. Plants should not be given inorganic fertilizers, see notes above on toxicity. A polymorphic species[1], it is often cultivated for its edible leaves, there are many named varieties[206]. This species is often cultivated in Asia for its edible leaves and seed[46, 58]. It is a very ornamental plant and is often grown in the flower garden[200]. Most if not all members of this genus photosynthesize by a more efficient method than most plants. Called the 'C4 carbon-fixation pathway', this process is particularly efficient at high temperatures, in bright sunlight and under dry conditions[196]. Special Features:Attractive foliage, Edible, Suitable for cut flowers, Suitable for dried flowers. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is clumping, giving the plant a clumping habit. The predictable growth behaviour makes it easier to maintain without having to apply containment methods[2-1].

4.2.103 Tilia mongolica

Mongolian Lime

3 tlin 6 cyuc 3 kcaok 0 tcan 1 dwat m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Tilia mongolica is a deciduous Tree growing to 15 m (49ft) by 12 m (39ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Leaves **Edible Uses:** Tea/Young leaves and shoots - raw or cooked[105]. An emergency food, it is only used when all else fails[177]. A refreshing herb tea is made from the flowers. A very good chocolate substitute is made from a paste of the ground fruits and flowers[2]. Trials on marketing the product failed because the paste decomposes readily[2].

tcanta FibreA fibre is obtained from the tough inner bark. It can be made into diverse items such as mats, shoes and coarse cloth[229].

dwatta Antispasmodic Diaphoretic SedativeA tea made from the flowers is antispasmodic, diaphoretic and sedative[226].

nrakta E. Asia - N. China to Mongolia. **ksacta Mountain slopes,** 1300 - 2300 metres in China[109].

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

nwatta Landscape Uses: Espalier, Screen, Specimen. Prefers a good moist loamy alkaline to neutral soil but succeeds on slightly acid soils[11, 200]. Grows poorly on any very dry or very wet soil[200]. Dislikes exposed positions according to one report[200], whilst another says that it is tolerant of exposure[125]. Succeeds in full sun or semi-shade[188]. Prefers a continental climate, growing more slowly and not producing fertile seed in areas with cool summers[200]. This species flourishes in Britain[11, 125]. Lime trees tend to hybridise freely if other members of the genus are growing nearby[238]. If growing plants from seed it is important to ensure the seed came from a wild source or from an isolated clump of the single species[K]. Grows best in a woodland situation, young plants tolerate a reasonable level of side shade[200]. Unlike most other members of this genus, this species does not usually become infested with aphids[125]. Quite tolerant of root disturbance, semi-mature trees up to 5 metres tall have been transplanted successfully. Plants in this genus are notably resistant to honey fungus[200]. **Special Features:** Not North American native, Fragrant flowers, Attractive flowers or blooms.

4.2.104 *Ligusticum canbyi*

Osha
3 tlin 6 cyuc 3 kcak 2 tcan 0 dwat 1.2 m hkuc
pcimhmim cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis hpa7tmwlati hjonli

drutta Ligusticum canbyi is a PERENNIAL 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 4. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep

woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: Leaves **Root Shoots Stem** **Edible Uses:** Leaves shoots and stems. A pleasant taste. The young leaves, shoots and stems can all be eaten. They have a strong celery flavour [1-2]. The root is chewed rather than eaten. Can be used as a culinary herb [1-2].

tcanta Invertebrates shelter: beneficial for insects and other arthropods. **Nectary:** provides nectar or pollen for beneficial insects [1-2].

nrakta Western North America. **ksacta Moist stream-banks,** slopes and meadows in the montane grasslands and shrublands zone.

propta Seed, Division.

nwatta A stout perennial herb from a thick taproot. The taproot is thick and fibrous. Prefers full shade and semi shade. Moist or wet soil. It grows in moist and wet stream banks. It grows at moderate and high elevations in Canada. Elevation (metres) 560 to 2300. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

4.2.105 *Asclepias incarnata*

Swamp Milkweed, Swamp Butterfly Weed, Marsh Milkweed
3 tlin 8 cyuc 3 kcak 3 tcan 2 dwat 1.2 m hkuc
hmimhtut cyutli kyuctcuphja7n hwicli hrasjlutnyikfrip hpa7tli flatprikhwis hpa7tmwlati fyifxre7t hjonli

drutta Asclepias incarnata is a PERENNIAL growing to 1.2 m (4ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to August, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry moist or wet soil.

pcista Although no specific reports have been seen for this species, many, if not all, members of this genus contain toxic resinoids, alkaloids and cardiac glycosides[274]. They are usually avoided by grazing animals[274]. The leaves and the stems might be poisonous[20].

kcakta Edible Parts: Flowers **Leaves Oil Seedpod** **Edible Uses:** Oil Sweetener Unopened flower buds - cooked[46, 61, 161]. Tasting somewhat like peas[85]. They can also be dried and stored for later use[183]. Young shoots - cooked. An asparagus substitute[85, 106]. Tips of older shoots are cooked like spinach[85]. Young seed pods, harvested when 3 - 4 cm long - cooked. A pea-like flavour, they are very appetizing[85]. The flower clusters can be boiled down to make a sugary syrup[85].

tcanta Fibre Latex Oil Pollution Stuffing WaxA good quality fibre is obtained from the bark[46, 57, 61, 95, 112, 169]. It is used in twine, cloth etc[112]. It is easily harvested in late autumn, after the plants have died down, by simply pulling it off the dead stems[112]. The seed floss is used to stuff pillows etc or is mixed with other fibres to make cloth[57, 171]. It is a Kapok substitute, it is used in Life Jackets or as a stuffing material[169, 171]. It is very water repellent. The floss has also been used to mop up oil spills at sea. Rubber can be made from latex contained in the leaves and stems[57]. Pods contain an oil and a wax which are of potential importance[171]. The dogbane-milkweed family *Asclepias*, *Apocynum*, *Calotropis*, and *Trachomitum* spp) has been used for fiber industrial crops for millennia with a number in cultivation as regional crops. All of these crops are dual-purpose fibres, offering bast fibres from the stem and seed finer or 'floss' in the fruit pods. Many have also been identified as potential hydrocarbon crops due to high latex content. Could be integrated into various agroforestry systems rather than as monocultures [1-1].

dwatta Anthelmintic Carminative Diuretic Emetic Laxative StomachicA tea made from the roots is anthelmintic, carminative, diuretic, emetic, strongly laxative and stomachic[4, 61, 222, 257]. The tea is said to remove tapeworms

from the body in one hour[257]. It also has also been used in the treatment of asthma, rheumatism, syphilis, worms and as a heart tonic[4, 207, 222]. An infusion of the roots is used as a strengthening bath for children and adults[257].

nrakta N. America - Quebec to Manitoba and Wyoming, south to Texas and New Mexico. ksacta Swamps, wet thickets and shores[43].

propta Seed - best sown in a greenhouse as soon as it is ripe in the autumn or in late winter[134, 169]. We have also had good results from sowing the seed in the greenhouse in early spring[K], though stored seed might need 2 - 3 weeks cold stratification[134]. Germination usually takes place in 1 - 3 months at 18°C[134]. As soon as the seedlings are large enough to handle, prick them out into individual pots and grow them on in the greenhouse for their first winter. Plant out when they are in active growth in late spring or early summer and give them some protection from slugs until they are growing away strongly. Division in spring. With great care since the plant resents root disturbance. Pot the divisions up and place them in a lightly shaded position in the greenhouse until they are growing away strongly, then plant them out in the summer, giving them some protection from slugs until they are established.. Basal cuttings in late spring. Use shoots about 10cm long with as much of their white underground stem as possible. Pot them up individually and place them in a lightly shaded position in a greenhouse until they are rooting and growing actively. If the plants grow sufficiently, they can be put into their permanent positions in the summer, otherwise keep them in the greenhouse until the following spring and when they are in active growth plant them out into their permanent positions. Give them some protection from slugs until they are established.

nwatta Experimental Crop Industrial Crop: Hydrocarbon Management: HayLandscape Uses:Border, Foundation, Massing. Prefers a well-drained light rich or peaty soil[1, 200]. Requires a moist soil and a sunny position, doing well by water[111, 134]. Succeeds on dry soils and on all soil types[112]. Plants are hardy to at least -25°C[187]. A very ornamental plant[1], the flowers are very attractive to butterflies[169]. The flower of many members of this genus can trap insects between its anther cells, the struggles of the insect in escaping ensure the pollination of the plant[207]. Many members of this genus seem to be particularly prone to damage by slugs. The young growth in spring is especially vulnerable, but older growth is also attacked and even well-established plants have been destroyed in wet years[K]. Plants resent root disturbance and are best planted into their final positions whilst small[134]. Special Features:Attractive foliage, North American native, Naturalizing, Wetlands plant, Attracts butterflies, Suitable for cut flowers, Fragrant flowers. The plant is heat tolerant in zones 9 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.106 *Nepeta cataria*

Catmint, Catnip

3 tlin 7 cyuc 3 kcaok 2 tcan 2 dwat 1 m hkuc

htut cyuti kyucup hwicli hraslut hpa7tli flatpriklwisslip hpa7tymwatli xre7t hjonli

drutta *Nepeta cataria* 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 3 and is not frost tender. It is in flower from July to November, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy)

soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil.

pcista Catnip has diuretic properties and may increase amount and frequency of urination. Smoking catnip can produce euphoria and visual hallucinations. Sedation. Women with inflammatory diseases of the pelvis or are pregnant should not use. Care if using and driving or using machines [301].

kcakta Edible Parts: LeavesEdible Uses: Condiment TeaYoung leaves - raw[7, 20]. A mint-like flavour, they make an aromatic flavouring in salads[7, K]. Older leaves are used as a flavouring in cooked foods[2, 27, 105]. They can be used fresh or dried to make an aromatic herb tea[21, 105, 183]. The tea should be infused in a closed container in order to preserve the essential oils, boiling is said to spoil it[218].

tanta Essential Herbicide Pot-pourri RepellentThe plant is said to deter insects such as ants and flea beetles[14, 20, 201] as well as rats and mice[4, 200, 201]. (The idea behind it being a rat repellent is probably based on the plants attraction to cats, see notes above.) A strong infusion can be used to repel fleas from carpets or the fur of animals[201]. An extract from the leaves (called nepetalactone) has herbicidal and insect repellent properties[222]. The freshly harvested flowering tops contain 0.3 - 1% essential oil by distillation[218]. It is mainly used for medicinal purposes[218]. The dried leaves retain their fragrance and can be used in pot-pourri[245].

dwatta Antianxiety Antispasmodic Antitussive Astringent Carminative Diaphoretic Emmenagogue Nervine Refrigerant Sedative Stimulant Stomachic TonicCatmint has a long history of use as a household herbal remedy, being employed especially in treating disorders of the digestive system and, as it stimulates sweating, it is useful in reducing fevers[254]. The herbs pleasant taste and gentle action makes it suitable for treating colds, flu and fevers in children. It is more effective when used in conjunction with elder flower (*Sambucus nigra*)[254]. The leaves and flowering tops are strongly antispasmodic, antitussive, astringent, carminative, diaphoretic, slightly emmenagogue, refrigerant, sedative, slightly stimulant, stomachic and tonic[4, 7, 9, 14, 21, 165, 218, 238]. The flowering stems are harvested in August when the plant is in full flower, they are dried and stored for use as required[4]. An infusion produces free perspiration, it is considered to be beneficial in the treatment of fevers and colds[4]. It is also very useful in the treatment of restlessness and nervousness, being very useful as a mild nervine for children[4]. A tea made from the leaves can also be used[213]. The infusion is also applied externally to bruises, especially black eyes[245].

nrakta Europe, including Britain, from Scandinavia south and east to Spain, W. and C. Asia to the Himalayas ksacta Roadsides and near streams[7]. Hedgerows, borders of fields, dry banks and waste ground, especially on calcareous and gravelly soils[4, 17].

propta Seed - best sown as soon as it is ripe in a cold frame in the autumn[200]. The germination of spring sown seed can be erratic[200], it is best sown in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle and plant them out into their permanent positions in the summer. The seed remains viable for about 5 years[4]. A fast-growing plant, the seedlings can reach flowering size in their first year[238]. If you have sufficient freshly ripe seed then it is well worth trying a sowing outdoors in situ in the autumn. Division in spring or autumn[200]. Very easy, large divisions can be planted out direct into their permanent positions. We have found that it is better to pot up the smaller divisions and grow them on in light shade in a cold frame until they are well established before planting them out in late spring or early summer. Basal cuttings in late spring or early summer. Harvest the shoots with plenty of underground stem when they are about 8 - 10cm above the ground. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer.

nwatta Easily grown in a light sandy soil in a sunny position[200]. Succeeds in heavier soils if the drainage is very good. Plants are hardy to about -25°C[187]. Catmint emits a scent that is irresistible to many cats, who will then avidly attack the plant[4, 7, 20, 46, 200]. The smell is said to be similar to certain cat hormones and is more effective with

male cats. Quite often a cat will completely destroy even a fairly large plant, small plants especially might need protection until well established[K]. Sometimes grown in the herb garden, there are some named varieties[183]. 'Citriodora' has lemon-scented leaves that are more attractive to people and less attractive to cats[183, 187]. If the plants are cut back hard when they are flowering a second crop of leaves will be produced[238]. Members of this genus are rarely if ever troubled by browsing deer or rabbits[233]. Catmint is a good companion plant to grow in the garden[238]. It is said to repel various cabbage pests, aphids (including peach aphids), flea beetles, cucumber beetles, squash bugs and ants from plants they grow near to[238]. The flowers are very attractive to bees[108].

4.2.107 *Ribes aciculare*

3 tlin 7 cyuc 3 kcaok 0 tcan 0 dwat 1 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikrlwis
hpa7tmwatli xre7t hjonli

drutta *Ribes aciculare* is a deciduous Shrub growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to June, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[105]. Large, sweet and tasty[2, 74]. The red fruit is up to 15mm in diameter[266].

nrakta E. Asia - northern China, Siberia. ksacta Open stony mountain and hill slopes[74]. Forest margins, thickets and rocky slopes at elevations of 1500 - 2100 metres in northern China[266].

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 Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. Quite tolerant of shade though not fruiting so well in such a position[11]. The dormant plant is hardy to about -20°C[200]. This species is closely related to *R. burejense*[200]. Plants can harbour a stage of 'white pine blister rust', so they should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.108 *Fritillaria pudica*

Yellow Fritillary

3 tlin 7 cyuc 3 kcaok 0 tcan 0 dwat 0.2 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikrlwis
hpa7tmwatli xre7t hjonli

drutta *Fritillaria pudica* is a BULB growing to 0.2 m (0ft 8in) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Root Seedpod Edible Uses: Bulb - raw or cooked[46, 61, 161]. It can also be dried for later use[46]. Commonly eaten as a food by the native North Americans, the small bulbs were eaten raw and the larger ones cooked[270]. Rich in starch, it is best used in the autumn[172]. The raw bulb tastes like potatoes, when cooked it tastes like rice[212]. It can be eaten as a vegetable or can be

added to soups etc[257]. The green seedpods can be eaten raw or cooked but are bitter[172]. A delicious flavour[212].

nrakta Western N. America - British Columbia to Wyoming, south to New Mexico. ksacta Grassland and sagebrush deserts to mixed coniferous forests, also on stony mountain slopes[60, 163], 400 - 2000 metres[90].

propta Seed - best sown as soon as ripe in a cold frame, it should germinate in the spring[1]. Protect from frost[134]. Stored seed should be sown as soon as possible and can take a year or more to germinate[134]. Sow the seed quite thinly to avoid the need to prick out the seedlings. Once they have germinated, give them an occasional liquid feed to ensure that they do not suffer mineral deficiency. Once they die down at the end of their second growing season, divide up the small bulbs, planting 2 - 3 to an 8cm deep pot. Grow them on for at least another year in light shade in the greenhouse before planting them out whilst dormant. Division of offsets in August[1]. The larger bulbs can be planted out direct into their permanent positions, but it is best to pot up the smaller bulbs and grow them on in a cold frame for a year before planting them out in the autumn. Bulb scales[163].

nwatta Best grown on a gritty well-drained sunny bank[42]. Plants must be kept dry in the summer[90, 134]. A very variable[270] and ornamental plant[1], but it is not easy to grow outdoors, though it has lived a long time in a bulb frame[90]. Flowers are produced in 4 - 6 years from seed[164]. The bulb produces bulbils freely[90].

4.2.109 *Asclepias tuberosa*

Pleurisy Root, Butterfly milkweed, Rolfs' milkweed, Indian Paintbrush

3 tlin 9 cyuc 3 kcaok 0 tcan 3 dwat 0.8 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikrlwis
hpa7tmwatli xre7t hjonli

drutta *Asclepias tuberosa* is a PERENNIAL growing to 0.8 m (2ft 7in) by 0.5 m (1ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects, Lepidoptera (Moths and Butterflies). Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Although no specific reports have been seen for this species, many, if not all, members of this genus contain toxic resinoids, alkaloids and cardiac glycosides[274]. They are usually avoided by grazing animals[274]. The plant is poisonous if eaten in large quantities[20, 62]. Very large doses can cause diarrhoea and vomiting[268].

kcakta Edible Parts: Flowers Leaves Oil Root Seedpod Edible Uses: Oil Sweetener Whilst most parts of this plant have been used as food, some caution is advised since large doses can cause diarrhoea and vomiting - see the notes above on toxicity. Flower buds - cooked. They taste somewhat like peas[85]. Young shoots - cooked. An asparagus substitute[2, 4, 46, 85, 183]. The tips of older shoots are cooked like spinach[85]. Young seed pods - cooked. Harvested when 3 - 4 cm long and before the seed floss begins to form, they are very appetizing[2, 4, 21, 61, 85]. The flower clusters can be boiled down to make a sugary syrup[2, 4, 85, 183]. In hot weather the flowers produce so much nectar that it crystallises out into small lumps which can be eaten like sweets, they are delicious[K]. Root - cooked[2, 4, 46, 61, 85, 105]. A nutty flavour[165]. Some reports say that it is poisonous[183]. An edible oil is obtained from the seed[112]. The seed is very small, however, and commercial usage would not be very viable.

tcanta Fibre Latex Oil Pollution Stuffing A good quality fibre is obtained from the bark and is used in making twine, cloth etc[112]. It is easily harvested in late autumn after the plant has died down by simply pulling the fibres off the dried stems[169]. The seed floss is used to stuff pillows etc or is mixed with other fibres to make cloth[169]. It is a kapok substitute, used in life jackets or as a stuffing material[169]. Very water repellent. The floss has also been used to mop up oil spills at sea. The plant is a potential source of latex, used for making rubber[57]. This species is the only member of the genus that does not have latex in its sap[213]. The seedpods contain an oil and a wax which are of potential impor-

tance. Candle wicks are made from the seed floss. The seed contains up to 21% of a semi-drying oil[112]. The dogbane-milkweed family *Asclepias*, *Apocynum*, *Calotropis*, and *Trachomitum* spp) has been used for fiber industrial crops for millennia with a number in cultivation as regional crops. All of these crops are dual-purpose fibres, offering bast fibres from the stem and seed finer or 'floss' in the fruit pods. Many have also been identified as potential hydrocarbon crops due to high latex content. Could be integrated into various agroforestry systems rather than as monocultures [1-1].

dwatta Antispasmodic Carminative Cathartic Diaphoretic Diuretic Dysentery Expectorant Poulitce Tonic VasodilatorPleurisy root is a bitter, nutty-flavoured tonic herb that increases perspiration, relieves spasms and acts as an expectorant[238]. It was much used by the North American Indians and acquired a reputation as a heal-all amongst the earlier white settlers[254, 257]. Its main use in present day herbalism is for relieving the pain and inflammation of pleurisy[254]. The root is antispasmodic, carminative, mildly cathartic, diaphoretic, diuretic, expectorant, tonic and vasodilator[4, 21, 46, 165]. The root was very popular as a medicinal herb for the treatment of a range of lung diseases, it was considered especially useful as an expectorant[4, 213, 254]. It has never been scientifically examined and warrants further investigation[213]. It has also been used internally with great advantage in the treatment of diarrhoea, dysentery, rheumatism etc[4]. Use with caution[21]. This remedy should not be prescribed for pregnant women[238]. See also the notes above on toxicity. The root is harvested in the autumn and can be used fresh or dried[238]. A poultice of the dried, powdered roots is used in the treatment of swellings, bruises, wounds, ulcers, lameness etc[222, 238, 268].

nrakta N. America - S. Ontario and New York to Minnesota, south to Florida and Colorado. ksacta Dry open sandy and gravelly soils and grassy places by the sides of roads[43, 187, 268].

propta Seed - best sown in a greenhouse as soon as it is ripe in the autumn or in late winter[134, 169]. We have also had good results from sowing the seed in the greenhouse in early spring[K], though stored seed might need 2 - 3 weeks cold stratification[134]. Germination usually takes place in 1 - 3 months at 18°C[134]. As soon as the seedlings are large enough to handle, prick them out into individual pots and grow them on in the greenhouse for their first winter. Plant out when they are in active growth in late spring or early summer and give them some protection from slugs until they are growing away strongly. Division in spring. With great care since the plant resents root disturbance. Pot the divisions up and place them in a lightly shaded position in the greenhouse until they are growing away strongly, then plant them out in the summer, giving them some protection from slugs until they are established.. Basal cuttings in late spring. Use shoots about 10cm long with as much of their white underground stem as possible. Pot them up individually and place them in a lightly shaded position in a greenhouse until they are rooting and growing actively. If the plants grow sufficiently, they can be put into their permanent positions in the summer, otherwise keep them in the greenhouse until the following spring and when they are in active growth plant them out into their permanent positions. Give them some protection from slugs until they are established.

nwatta Experimental Crop Industrial Crop: Hydrocarbon Management: HayLandscape Uses:Border, Container, Foundation, Massing, Rock garden, Seashore, Specimen. Prefers a well-drained light, rich or peaty soil[1, 200]. Prefers a sandy soil and a sunny position[111, 233]. Prefers a slightly acid soil[238]. Prefers a dry soil[187, 238]. Plants are hardy to about -20°C[187]. Another report says that this species is only suited to the warmer areas of Britain[233]. A very ornamental plant[1], but it is not easy to establish or to keep in British gardens[233]. Resents root disturbance[4, 134], plants should be pot-grown from seed and planted out in their permanent positions when young. Plants are particularly at risk from slugs, however, and some protection will probably be required until the plants are established and also in the spring when the new shoots come into growth[K]. The flower can trap insects between its anther cells, the struggles of the insect in escaping ensure the pollination of the plant[207]. Special Features: Attractive foliage, North American native, Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers, Attractive flowers or blooms.

4.2.110 Campanula carpatica

Tussock Bellflower, Carpathian Bellflower, Carpathian Harebell

3 tlin 8 cyuc 3 kcaak 2 tcan 0 dwat 0.3 m hkuc hmimhtut cyutli tcup hwicli hyishrasjlut hpa7tli flatprikliwshpa7tmwatli fyifxre7t hjonli

drutta *Campanula carpatica* is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Flowers LeavesEdible Uses: Leaves - raw or cooked. A pleasant flavour, they are slightly sweet but a little bit chewy when eaten raw[K]. Flowers - raw or cooked. Slightly sweet, they make a pleasant and decorative addition to salads[K].

tcanta Plants make a good ground cover when planted about 30cm apart each way, forming a spreading clump[208].

nrakta S. E. Europe - Carpathian Mountains. ksacta Not known

propta Seed - surface sow spring in a cold frame. Seed usually germinates in 2 - 4 weeks at 18°C. Very easy from seed[221]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Basal cuttings in spring. Harvest the shoots when they are about 10 - 15cm long with plenty of underground stem. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer. Division in spring or autumn. Very easy[221], larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the summer or following spring.

nwatta Landscape Uses:Border, Container, Ground cover, Rock garden. Prefers a moist but well-drained rich sandy loam and a neutral or alkaline soil in a sunny position though it also tolerates partial shade[1, 200, 208]. A very easy species to grow, it will tolerate almost any soil or situation though it prefers the fullest amount of sun[221]. Plants grow well on a sunny wall so long as the roots have soil to grow into[219]. Plants are hardy to at least -15°C[200]. A very free-flowering plant, indeed it has one of the longest flowering periods of any species in this genus[271]. If the plant is cut back as the flowers fade, it will usually produce a second flush of flowers later in the season[271]. The species in this genus do not often hybridize and so seed can generally be relied upon to come true[221]. This species, however, especially under garden conditions, is more likely to produce hybrids than most other members of the genus[271]. The plants are self-fertile[221]. A very variable species in the wild[271]. There are many named varieties selected for their ornamental value[200]. 'Chewton Joy' has pleasantly flavoured leaves[K]. Members of this genus are rarely if ever troubled by browsing deer[233]. Special Features: Attractive foliage, Not North American native, Suitable for cut flowers. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

4.2.111 Asarum canadense

Snake Root, Canadian wildginger, Canada Wild Ginger, Wild Ginger

3 tlin 9 cyuc 3 kcaak 3 tcan 3 dwat 0.1 m hkuc
pcimhmim cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Asarum canadense is a deciduous Perennial growing to 0.1 m (0ft 4in) by 0.5 m (1ft 8in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Flies. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

pcista The leaves are poisonous[19]. Handling the leaves is said to cause dermatitis in some people[269].

kcakta Edible Parts: Edible Uses: CondimentThe underground stem and the flowers are used as a ginger substitute[2, 55, 106, 177, 183]. The root, especially when quite dry, has a pungent, aromatic smell like mild pepper and ginger mixed, but more strongly aromatic[245]. The root is best harvested in autumn but is available all year round[159]. It can be dried for later use[159].

tcanta IncenseThe slightly roasted root can be ground into a powder and then sprinkled onto clothing for perfume[257]. A useful ground cover for a shady position so long as it is not dry[197], spreading by its roots[208].

dwatta Anthelmintic Antiasthmatic Antibiotic Antitumor Carminative Contraceptive Diaphoretic Diuretic Expectorant Irritant Poultice Salve Stimulant Stomachic TonicSnake root was widely employed as a medicinal herb by a number of native North American tribes who used it to treat a wide range of ailments[257]. It is still occasionally used in modern herbalism. The root is anthelmintic, carminative, diaphoretic, diuretic, expectorant, irritant, powerfully stimulant, stomachic and tonic[4, 21, 46, 200, 238, 257]. It is harvested in the autumn and dried for later use[4]. It is used in the treatment of chronic chest complaints, asthma, coughs, colds, dropsy, painful spasms of the bowels and stomach, scant or painful menstruation, infantile convulsions[4, 257]. The fresh leaves are applied as a poultice to wounds and inflammations, whilst a decoction or salve is applied to sores[257]. The root contains antibiotic substances effective against broad-spectrum bacteria and fungi[207]. It also contains aristolochic acid, which has antitumor activity[222]. The root and rhizome were slowly boiled in a small quantity of water for a long time and the resulting liquid drunk as a contraceptive by the women of one N. American Indian tribe[213].

nrakta Eastern N. America - Manitoba to New Brunswick, south to N. Carolina and Kansas. ksakta Moist rich soils in woodlands, usually on calcareous soils[43, 159]. Understorey of deciduous (rarely coniferous) forests from sea level to 1300 metres[270].

propta Seed - best sown in a cold frame as soon as it is ripe in the summer[134]. Stored seed will require 3 weeks cold stratification and should be sown in late winter[134]. The seed usually germinates in the spring in 1 - 4 or more weeks at 18°C[134]. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. Plant them out when large enough in late spring. Division in spring or autumn. Plants are slow to increase[200]. It is best to pot the divisions up and keep them in light shade in the greenhouse until they are growing away strongly.

nwatta Landscape Uses:Ground cover, Massing, Rock garden, Woodland garden. Prefers a rich moist neutral to acid soil in woodland or a shady position in the rock garden[1, 200]. Plants are found on alkaline soils in the wild[43]. Plants are hardy to at least -25°C[200]. The flowers are malodorous and are pollinated by flies[200]. Plants often self-sow when growing in a suitable position[200]. Special Features:Attractive foliage, North American native, Naturalizing, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temper-

ature climbs to over 66 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.112 Erythronium dens

Dog's-Tooth Violet

3 tlin 7 cyuc 3 kcaak 0 tcan 0 dwat 0.2 m hkuc
hmim cyutli tcup hwicli hrasjlut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

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

pcista Skin contact with the bulbs has been known to cause dermatitis in sensitive people[65].

kcakta Edible Parts: Leaves RootEdible Uses: Bulb - raw or cooked and used as a vegetable[46]. It can be dried to make a flour[22, 46, 61] and is also the source of a starch used in making 'vermicelli' and cakes[183]. Leaves - cooked[46, 61, 183]. Eating the leaves will greatly reduce the vigour of the bulb, so can only be recommended in times of emergency[K].

nrakta Europe. ksakta Woods, scrub and mountain grassland, to 1700 metres[50].

propta Seed - best sown as soon as it is ripe in a shady position in a cold frame. Water lightly in summer, it should germinate in autumn or winter[164, 200]. Stored seed requires a period of cold stratification[164]. Sow as early in spring as possible in a cold frame. Sow the seed thinly so that it will not be necessary to prick them out for their first year of growth. Give an occasional liquid feed to the seedlings to make sure that they do not become nutrient deficient. When the plants are dormant, pot up the small bulbs putting 2 - 3 bulbs in each pot. Grow them on in a shady position in the greenhouse for another 2 3 years and then plant them out into their permanent positions when they are dormant in late summer. Division of the bulbs in the summer as the leaves die down[1]. Larger bulbs can be replanted immediately into their permanent positions, but it is best to pot up smaller bulbs and grow them on in a shady position in a greenhouse for a year before planting them out when dormant in late summer.

nwatta Prefers slightly acid soil conditions but succeeds in chalky soils if these contain plenty of humus[164]. Requires semi-shade, preferably provided by trees or shrubs, and a well-drained soil[42, 164]. Succeeds in almost any light soil, preferring one that is rich in humus[1]. Thrives in light grass[90, 200]. This species does not flower very freely, increasing mainly by its stoloniferous habit[164]. Flowers are produced in 3 - 4 years from seed[164]. Bulbs should be planted about 7cm deep[1]. There are many named forms, selected for their ornamental value[207]. Many of these cultivars have a habit to divide freely to form clumps containing many small non-flowering bulbs[257]. To remedy this, the bulbs should be lifted and divided, replanting them singly about 10cm below soil level[258].

4.2.113 Tragopogon pratensis

Goat's Beard

3 tlin 7 cyuc 3 kcaak 0 tcan 2 dwat 0.6 m hkuc
htut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikwlis
hpa7tmwatli fyifxre7t hjonli

drutta Tragopogon pratensis is a ANNUAL/PERENNIAL growing to 0.6 m (2ft). 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 Bees, flies. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Leaves Root Stem Edible Uses: Root - raw or cooked[2, 9, 12, 52, 100]. The roots have a sweet flavour due to their inulin content[7]. The young roots can be eaten raw whilst older roots are best cooked like parsnips or salsify[9]. They are often blanched before use[183]. Young leaves and shoots - raw or cooked[2, 5, 12, 52, 62, 183]. They can be added to mixed salads or used in soups etc[7, 9]. The leaves are best used as they come into growth in the spring[9]. The flowering stem, including the buds, is cooked and served like asparagus[183].

tcanta Cosmetic An infusion of the petals is used to clear the skin and lighten freckles[7]. A distilled water made from the plant is used in cleansing lotions for dry skins[7].

dwatta Astringent Depurative Diuretic Expectorant Stomachic Goat's beard is considered to be a useful remedy for the liver and gallbladder[254]. It appears to have a detoxifying effect and may stimulate the appetite and digestion. Its high inulin content makes this herb a useful food for diabetics since inulin is a nutrient made of fructose rather than glucose units and therefore does not raise blood sugar levels[254]. The root is astringent, depurative, diuretic, expectorant, nutritive and stomachic[7, 21]. A syrup made from the root gives great relief in cases of obstinate coughs and bronchitis[7]. A decoction of the root is given in the treatment of heartburn, loss of appetite and disorders of the breast or liver[240]. The root is harvested in the autumn and dried for later use[7]. The fresh juice of young plants is said to be a good dissolver of bile, relieving the stomach without side effects[4].

nrakta Europe, including Britain, from Scandinavia south and east to Spain, Caucasus, Siberia, Iran. ksacta Meadows, pastures, dunes, waysides and waste places[17].

propta Seed - sow spring in situ. Make sure to water the seed in if the weather is dry.

nwatta Succeeds in ordinary garden soils, including heavy clays[200]. Goat's beard was formerly cultivated as a vegetable, though it has now fallen into disuse[2, 4]. Grows well in the summer meadow[24]. The flowers open at day-break and close before noon[4].

4.2.114 *Rhexia virginica*

Deer Grass, Handsome Harry

3 tlin 7 cyuc 3 kcaak 0 tcan 1 dwat 0.3 m hkuc
hptat ymtuti tcup hwicli hrasjlut hpa7tli frusflatprik
hpa7tmwatli xre7t hjonli

drutta *Rhexia virginica* is a PERENNIAL growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to August. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Leaves Root Edible Uses: Drink Leaves - raw or cooked[105]. A sweetish slightly acid taste[106, 183, K]. It makes a pleasant salad[183]. Roots - raw. They can be chopped and added to salads or used as a pleasant nut-like nibble[183]. A sour drink is made from the leaves and stems[257].

dwatta Miscellanea Tea made from the leaves and stems is used as a throat cleaner[257].

nrakta Eastern N. America - Maine to Ontario, south to Florida, Missouri and Louisiana. ksacta Peat, wet sands and gravels to 700 metres[43]. Usually found in moist acid sandy soils[200].

propta Seed - sow spring in a greenhouse and only just cover the seed. Germination should take place within 10 weeks. Prick out the seedlings into individual pots when

they are large enough to handle and grow them on a cold greenhouse or frame for their first winter. Plant out in late spring[K]. Division in 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 Requires a moist but freely draining neutral or acid peaty soil[200]. Incorporate sand or grit into the soil if necessary at planting time[200]. Grows well in a bog garden[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

4.2.115 *Mentha x piperita officinalis*

White Peppermint

3 tlin 7 cyuc 3 kcaak 3 tcan 5 dwat 0.5 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnykifrip hpa7tli flatprikli-
wis hpa7tmwatli xre7t hjonli

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

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

kcakta Edible Parts: Leaves Edible Uses: Condiment Tea Leaves - raw or cooked. A mild peppermint flavour, they are used as a flavouring in salads or cooked foods[183]. An essential oil from the leaves and flowers is used as a flavouring in sweets, chewing gum, ice cream etc[183]. A herb tea is made from the fresh or dried leaves[183].

tcanta Essential Repellent Strewing An essential oil obtained from the whole plant is used in perfumery[46, 105]. It is also an ingredient of oral hygiene preparations, toilettries etc[238]. Peppermint leaves are used as an ingredient of pot-pourri[238]. They were formerly used as a strewing herb[14]. The plant repels insects, rats etc[14, 18, 20]. Rats and mice intensely dislike the smell of mint. The plant was therefore used in homes as a strewing herb and has also been spread in granaries to keep the rodents off the grain[244]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch. Dynamic accumulator.

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

nrakta Britain. ksacta A natural hybrid, *M. aquatica* x *M. spicata* found in moist soils.

propta Seed - sow spring in a cold frame. Germination is usually fairly quick. Prick out the seedlings into individual

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

mint Succeeds in most soils and situations so long as the soil is not too dry[1, 200]. Grows well in heavy clay soils. A sunny position is best for the production of essential oils, but the plant also succeeds in partial shade. Prefers a slightly acid soil[16]. Often grown in the herb garden and also commercially for its essential oil. The whole plant has a pleasant aroma of peppermint. Most mints have fairly aggressive spreading roots and, unless you have the space to let them roam, they need to be restrained by some means such as planting them in containers that are buried in the soil[K]. Hybridizes freely with other members of this genus. The flowers are very attractive to bees and butterflies[24]. A good companion for growing near cabbages and tomatoes, helping to keep them free of insect pests[14, 20]. Produces a better quality essential oil if the plant is grown in dry ground[115]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

4.2.116 *Asclepias speciosa*

Showy Milkweed

3 tlin 9 cyuc 3 kcak 3 tcan 2 dwat 0.8 m hkuc
 hmimhtut cyutli kyucptuc hwicli hrasjlut hpa7tli flatprikhwis
 hpa7tmwatli fyifxre7t hjonli

drutta *Asclepias speciosa* is a PERENNIAL growing to 0.8 m (2ft 7in) by 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from June to August, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Although no specific reports have been seen for this species, many, if not all, members of this genus contain toxic resinoids, alkaloids and cardiac glycosides[274]. They are usually avoided by grazing animals[274]. One report says that the plant is considered poisonous in large quantities by some native North American Indian tribes[257].

kcakta Edible Parts: Flowers Leaves Oil Root Seed Seed-pod
 Edible Uses: Gum Oil Sweetener Flower buds - raw or cooked[61, 92]. They taste somewhat like peas[85]. They can be used to thicken soups[257]. Young shoots and leaves-cooked[46, 61, 62, 92, 95]. An asparagus substitute[85, 183]. One report says that they should not be eaten raw[85], whilst another says that the young spring shoots were eaten raw by some native American tribes[257]. Tips of older shoots are cooked like spinach[85, 183]. Young seed pods, 3 - 4 cm long - raw or cooked[85, 257]. Very appetizing[85]. The immature pods are peeled before being eaten[257]. Flower clusters can be boiled down to make a sugary syrup[85] or they can be eaten raw[161, 183]. Seed - raw[161, 257]. A chewing gum can be made from the latex contained in the stem and leaves[46, 61, 92, 183]. Root[183]. No further details

are given, but another report says that the root can be poisonous in large quantities[257].

tcanta Dye Fibre Gum Latex Oil Paper Pollution Stuffing
 A good quality tough fibre is obtained from the bark[92, 99]. It is used in twine, coarse cloth, paper etc[92, 99]. The fibre is 10 - 45mm long[189]. It is easily harvested in late autumn, after the plants have died down, by simply pulling it off the dead stems[168, 169]. When making paper, the stems can be retted by leaving them in the ground until they are dry in the winter or they can be harvested in late summer, the leaves removed and the stems steamed to remove the fibre[189]. The stems are then cooked for two hours with lye and pounded with mallets[189]. The paper colour varies from white to creamy green depending on how the paper is made[189]. If the stems are used in the summer the latex will often find its way onto the fibres and is hard to remove[189]. The seed floss is used to stuff pillows etc, or is mixed with other fibres to make cloth[168, 169]. It has also been used as a baby's nappy[257]. The seed floss is a Kapok substitute, used in Life Jackets or as a stuffing material[169]. It is very water repellent. The floss has also been used to mop up oil spills at sea. Rubber can be made from latex contained in the leaves and the stems[57, 92, 112]. The yield is up to 3%[112]. Pods contain an oil and a wax which are of potential importance. A green dye is obtained from the flowers and leaves combined[168]. *Asclepias speciosa* is a specific Monarch butterfly food and habitat plant. The dogbane-milkweed family *Asclepias*, *Apocynum*, *Calotropis*, and *Tra-chomitum* spp) has been used for fiber industrial crops for millennia with a number in cultivation as regional crops. All of these crops are dual-purpose fibres, offering bast fibres from the stem and seed finer or 'floss' in the fruit pods. Many have also been identified as potential hydrocarbon crops due to high latex content. Could be integrated into various agro-forestry systems rather than as monocultures [1-1].

dwatta Antirheumatic Antiseptic Ophthalmic Skin Stomachic VD Warts
 The latex is used as a cure for warts[168, 257]. The latex needs to be applied at least once a day of a period of some weeks for it to be effective[K]. The latex has antiseptic properties and has been used to treat skin sores, cuts and ringworm[257]. A decoction of the plant tops can be strained and used to treat blindness and snow-blindness[257]. The root is either chewed when fresh, or dried, ground into a powder then boiled, and used in the treatment of stomach ache[257]. A decoction of the roots has been used in small doses to treat venereal diseases and also to treat coughs, especially from TB[257]. A poultice of the mashed roots has been applied to rheumatic joints[257]. Some caution should be employed when using the root since there is a report that it can be poisonous in large quantities[257].

nrakta Western N. America - Minnesota to British Columbia, south to Kansas, Utah and California. ksacta Prairies, in sandy and loamy, usually moist soils[60].

propta Seed - best sown in a greenhouse as soon as it is ripe in the autumn or in late winter[134, 169]. We have also had good results from sowing the seed in the greenhouse in early spring[K], though stored seed might need 2 - 3 weeks cold stratification[134]. Germination usually takes place in 1 - 3 months at 18°C[134]. As soon as the seedlings are large enough to handle, prick them out into individual pots and grow them on in the greenhouse for their first winter. Plant out when they are in active growth in late spring or early summer and give them some protection from slugs until they are growing away strongly. Division in spring. With great care since the plant resents root disturbance. Pot the divisions up and place them in a lightly shaded position in the greenhouse until they are growing away strongly, then plant them out in the summer, giving them some protection from slugs until they are established.. Basal cuttings in late spring. Use shoots about 10cm long with as much of their white underground stem as possible. Pot them up individually and place them in a lightly shaded position in a greenhouse until they are rooting and growing actively. If the plants grow sufficiently, they can be put into their permanent positions in the summer, otherwise keep them in the greenhouse until the following spring and when they are in active growth plant them out into their permanent positions. Give them some protection from slugs until they are established.

nwatta Experimental Crop Industrial Crop: Hydrocarbon Management: Hay
 Prefers a well-drained light rich or peaty soil and a sunny position[1, 134, 200]. A very ornamental plant[1], it is closely related to *A. purpurascens*[200].

The roots can spread quite freely when the plant is in a suitable position[233]. Many members of this genus seem to be particularly prone to damage by slugs. The young growth in spring is especially vulnerable, but older growth is also attacked and even well-established plants have been destroyed in wet years[K]. Plants resent root disturbance and are best planted into their final positions whilst small[134]. The flower of many members of this genus can trap insects between its anther cells, the struggles of the insect in escaping ensure the pollination of the plant[207].

4.2.117 *Rubus flagellaris*

Northern Dewberry

3 tlin 7 cyuc 3 kcaak 1 tcan 1 dwat 0.2 m hkuc
hmmhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta *Rubus flagellaris* is a deciduous Shrub growing to 0.2 m (0ft 8in) by 2 m (6ft). See above for USDA hardiness. It is hardy to UK zone 3. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects, Apomictic (reproduce by seeds formed without sexual fusion). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Stem Edible Uses: Tea Fruit - raw or cooked in pies, preserves etc[46, 61, 105, 161, 171, 183, 257]. A rich flavoured[43]. The fruit is about 15mm in diameter[200]. Young shoots - peeled and eaten raw[183]. They are harvested as they come through the ground in spring and whilst they are still young and tender. The dried leaves make a fine tea[183].

tcanta Dye A purple to dull blue dye is obtained from the fruit[168]. A black dye is obtained from the green twigs[207].

dwatta Antihæmorrhoidal Antirheumatic Astringent Stimulant Tonic VD The root is astringent, stimulant and tonic[257]. An infusion has been used in the treatment of diarrhoea, venereal disease and rheumatism[257]. An infusion has been used as a wash in the treatment of piles[257]. The root has been chewed as a treatment for a coated tongue[257]. The leaves are astringent[257]. An infusion has been used in the treatment of diarrhoea[257].

nrakta Eastern N. America. ksacta Dry fields, openings and borders of thickets[43] in slightly acid soils[159].

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

nwatta Easily grown in a good well-drained loamy soil in sun or semi-shade[1, 11, 200]. A very polymorphic species[43], it is sometimes cultivated for its edible fruit and there are some named varieties[1, 171, 183]. This species is a blackberry with biennial stems, it produces a number of new stems each year from the perennial rootstock, these stems fruit in their second year and then die[200]. The plant produces apomictic flowers, these produce fruit and viable seed without fertilization, each seedling is a genetic copy of the parent[200]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.118 *Oxalis acetosella*

Wood Sorrel

3 tlin 7 cyuc 3 kcaak 3 tcan 2 dwat 0.1 m hkuc
pcmhmmhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikwis hpa7tmwatli fyifxre7t hjonli

drutta *Oxalis acetosella* is a PERENNIAL growing to 0.1 m (0ft 4in) by 0.3 m (1ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, cleistogamy. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

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: Flowers Leaves Edible Uses: Curdling agent Leaves - raw or cooked[2, 7, 12, 37]. A distinctly lemony flavour, the leaves make a refreshing, thirst-quenching munch and are also added to salads, soups, sauces etc[183]. This leaf should be used in moderation[4, 5, 9, 76], see the notes above on toxicity. Flowers - raw. A decorative addition to salads[K]. The dried plant can be used as a curdling agent for plant milks[66].

tcanta Cleanser The juice of the leaves removes iron mould stains from linen[6, 66, 115]. Plants can be grown as a ground cover in woodland or under the shade of shrubs[208]. They should be spaced about 45cm apart each way[208].

dwatta Anodyne Antiscorbutic Astringent Diuretic Emmenagogue Expectorant Febrifuge Irritant Stomachic The fresh or dried leaves are anodyne, antiscorbutic, astringent, diuretic, emmenagogue, expectorant, febrifuge, irritant and stomachic[4, 7, 9, 21]. A decoction is used in the treatment of fevers, both to quench the thirst and allay the fever[4]. Externally, the leaves are crushed and applied locally to dispel boils and abscesses, they also have an astringent affect on wounds[7]. When used internally, some caution is advised due to the oxalic acid content of the leaves[4], the plant is contra-indicated for people suffering from gastritis or a calculus condition[7].

nrakta Europe, including Britain, from Iceland south and east to Spain, N. and C. Asia to Japan. ksacta Moist woods, moorland and on shady rocks[187].

propta Seed - best sown as soon as it is ripe in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in late spring or early summer. Division in spring. Very easy, larger divisions can be planted out direct into their permanent positions. We have found that it is better to pot up the smaller divisions and grow them on in light shade in a cold frame until they are well established before planting them out in late spring or early summer.

nwatta Prefers moist shady conditions and a humus rich soil in shade or dappled sunlight[4, 9, 13, 27, 37, 200]. Dislikes very heavy and wet soils[17]. Plants are hardy to about -25°C[187]. A dainty woodland carpeter growing well in a woodland or wild garden[28, 200]. When well sited the plants can run aggressively and also self-sow[208]. The plant flowers in early spring, but does not produce much fertile seed at this time. Most of the fertile seed is produced from cleistogamous flowers during the summer[17].

4.2.119 *Empetrum nigrum*

Crowberry, Black crowberry, Black Crowberry

3 tlin 8 cyuc 3 kcaak 1 tcan 2 dwat 0.3 m hkuc
hmmhtut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprik hpa7tmwatli nyanhjen hjonli

drutta *Empetrum nigrum* is an evergreen Shrub growing to 0.3 m (1ft) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in leaf all year, in flower from May to June, and the seeds ripen in September. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). 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 can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Fruit **Edible Uses:** Tea Fruit - raw or cooked[1, 2, 3, 5, 65]. It can taste slightly acid or insipid[101]. Not very desirable[11], it tastes best after a frost[172]. A watery flavour, it is mainly used for making drinks, pies, preserves etc[183]. The Inuit dry or freeze them for winter use[183]. The fruit can hang on the plant all winter[172]. The fruit is about 7.5mm in diameter[200]. A tea can be made from the twigs[183].

tcanta Dye A purple dye is obtained from the fruit[115]. Can be used for groundcover in exposed locations[200]. Plants should be spaced about 25cm apart each way[208].

dwatta Astringent Diuretic Kidney Ophthalmic The leafy branches have been used, especially for children with a fever, as a diuretic[257]. It has also been used to treat kidney problems[257]. A decoction or infusion of the stems, or the cooked berries, have been used in the treatment of diarrhoea[257]. A decoction of the leaves and stems, mixed with Hudson Bay tea and young spruce tree tips, has been used in the treatment of colds[257]. A decoction of the roots has been used as an eyewash to remove a growth[257].

nrakta Europe, including Britain, Iceland to the Pyrenees, east to Siberia and Bulgaria and also N. America **ksacta Moors** and mountain tops, and in the drier parts of blanket bogs[17].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be very slow to germinate, stored seed requires 5 months warm then 3 months cold stratification at 5°C[200]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 3cm with a heel, July/August in a frame. Takes 3 weeks. Good percentage[78, 200]. Cuttings of mature wood of the current year's growth, 3cm with a heel, October in a frame. Requires shade. Good percentage[78, 200].

nwatta Landscape Uses: Erosion control, Foundation, Ground cover, Massing, Rock garden. A calcifuge plant, it is easily grown in a lime-free soil[200]. Prefers a moist sandy peaty soil and some shade[1, 3]. The two names var. 'Rubrum' and var. 'Purpureum' are of doubtful application to this species and may refer to *E. eamesii*[200]. Plants are usually dioecious though hermaphrodite forms are known. Male and female plants will normally need to be grown if fruit and seed are required. **Special Features:** Attractive foliage, North American native, Inconspicuous flowers or blooms.

4.2.120 *Campanula carpatica turbinata*

3 tlin 7 cyuc 3 kcaak 2 tcan 0 dwat 0.3 m hkuc
htut cyutli tcup hwicli hyhshrasljut hpa7tli flatprikrlwis hpa7tmwatli fyifxre7t hjonli

drutta Campanula carpatica turbinata is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Flowers **Leaves Edible Uses:** Leaves - raw or cooked. A pleasant sweet flavour, but the leaves are a bit hairy[K]. Flowers - raw or cooked. Slightly sweet, they make a very pleasant and decorative addition to the salad bowl[K].

tcanta Plants make a good ground cover when planted about 30cm apart each way, forming a spreading clump[208].

nrakta S. E. Europe - Carpathian Mountains. **ksacta** Not known

propta Seed - surface sow spring in a cold frame. Seed usually germinates in 2 - 4 weeks at 18°C. Very easy from

seed[221]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Basal cuttings in spring. Harvest the shoots when they are about 10 - 15cm long with plenty of underground stem. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer. Division in spring or autumn. Very easy[221], larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the summer or following spring.

nwatta Prefers a moist but well-drained rich sandy loam and a neutral or alkaline soil in sun or partial shade[1, 200]. A very easy species to grow, it will tolerate almost any soil or situation though it prefers the fullest amount of sun[221]. Plants are hardy to at least -15°C[200]. This is a smaller growing geographic form of the species[208]. A very free-flowering plant, indeed it has one of the longest flowering periods of any species in this genus[271]. If the plant is cut back as the flowers fade, it will usually produce a second flush of flowers later in the season[271]. The species in this genus do not often hybridize and so seed can generally be relied upon to come true[221]. This species, however, especially under garden conditions, is more likely to produce hybrids than most other members of the genus[271]. The plants are self-fertile[221]. There are several named varieties selected for their ornamental value[200]. 'Wheatley Violet' has somewhat hairy leaves with a pleasing scent[200]. Members of this genus are rarely if ever troubled by browsing deer[233].

4.2.121 *Amaranthus retroflexus*

Pigweed, Redroot amaranth, Wild Beet
3 tlin 11 cyuc 3 kcaak 2 tcan 2 dwat 0.9 m hkuc
htut cyutli hgattcup hwicli hrasljutnyk hpa7tli frusflatprikrlwissil hpa7tmwatli fyif hjonli

drutta Amaranthus retroflexus is an ANNUAL growing to 0.9 m (3ft). See above for USDA hardiness. It is hardy to UK zone 4 and is frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid and very alkaline soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought.

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

kcakta Edible Parts: Leaves **Seed Edible Uses:** Young leaves - raw or cooked as a spinach[2, 5, 62, 85, 159]. A mild flavour, it is often mixed with stronger flavoured leaves[183]. Very rich in iron, it is also a good source of vitamins A and C[201]. Seed - raw or cooked[2, 46, 61, 85]. Ground into a powder and used as a cereal substitute[5], it can also be sprouted and added to salads. The seed is very small, about 1mm in diameter[266], but easy to harvest and very nutritious. The flavour is greatly improved by roasting the seed before grinding it[183]. It is often added to maize meal[183]. The seed can be cooked whole, and becomes very gelatinous like this, but it is rather difficult to crush all of the small seeds in the mouth and thus some of the seed will pass right through the digestive system without being assimilated[K].

tcanta Dye Fodder Yellow and green dyes can be obtained from the whole plant[168]. Like many other species of *Amaranthus*, this plant may be harmful and even deadly when fed to cattle and pigs in large amounts. However, when supplied in moderation, it is regarded as an exceptionally nutritious fodder.

dwatta Astringent A tea made from the leaves is astringent[222]. It is used in the treatment of profuse menstruation, intestinal bleeding, diarrhoea etc[222, 238, 257]. An

Use has been used to treat hoarseness[257].
nrakta Tropical America. A casual in Britain[17]. ksacta A casual of cultivated land and waste places in Britain[17].
propta Seed - sow late spring in situ. An earlier sowing can be made in a greenhouse and the plants put out after the last expected frosts. Germination is usually rapid and good if the soil is warm[133]. A drop in temperature overnight aids germination[133]. Cuttings of growing plants root easily[206].

nwatta Prefers a well-drained fertile soil in a sunny position[200]. Requires a hot sheltered position if it is to do well[K]. Plants should not be given inorganic fertilizers, see notes above on toxicity. A good companion for potatoes, onions, corn, tomatoes, peppers and aubergines[20, 201]. A deep rooted plant, bringing up minerals from lower levels of the soil[201]. Formerly cultivated as a food crop by the N. American Indians[85]. Most if not all members of this genus photosynthesize by a more efficient method than most plants. Called the 'C4 carbon-fixation pathway', this process is particularly efficient at high temperatures, in bright sunlight and under dry conditions[196]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is clumping, giving the plant a clumping habit. The predictable growth behaviour makes it easier to maintain without having to apply containment methods[2-1].

4.2.122 Viola cucullata

Marsh Blue Violet

3 tlin 8 cyuc 3 kcaak 3 tcan 1 dwat 0.2 m hkuc
hmimhtut cyutli tcuphja7n hwicli hrasjlutnyik hpa7tli flat-
priklwis hpa7tmwatli fyfxire7t hjonli

drutta Viola cucullata is a PERENNIAL growing to 0.2 m (0ft 8in) by 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Cleistogomy (self-pollinating without flowers ever opening). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil.

kcakta Edible Parts: Flowers Leaves Edible Uses: Tea Young leaves and flower buds - raw or cooked[61, 105]. When added to soup they thicken it in much the same way as okra[85, 159, 177]. A tea can be made from the leaves[85].

tcanta Repellent A good ground cover plant but it is slow to thicken up and may need weeding for the first year or so[197]. An infusion of the root has been used to soak corn seeds before planting them in order to keep off insects[257]. Faunal Associations: The floral nectar of Marsh Violet attracts bumblebees, mason bees (Osmia spp.), Halictid bees, Andrenid bees, bee flies (Bombyliidae), butterflies, and skippers (Robertson, 1929). Some of the bees also collect pollen. An oligolectic bee, Andrena violae, visits the flowers of Marsh Violet and other Viola spp. (violets). The caterpillars of several Fritillary butterflies feed on the foliage of violets primarily in open areas: Boloria bellona (Meadow Fritillary), Boloria selene myrina (Silver-Bordered Fritillary), Euptoieta claudia (Variegated Fritillary), Speyeria aphrodite (Aphrodite Fritillary), Speyeria atlantis (Atlantis Fritillary), Speyeria cybele (Great Spangled Fritillary), and Speyeria idalia (Regal Fritillary). Other insect feeders include caterpillars of the moths Elaphria grata (Grateful Midget) and Eubaphe mendica (The Beggar), the leaf-mining larvae of Ametastegia pallipes (Violet Sawfly), the aphid Neotoxoptera violae, and the thrips Odontothrips pictipennis. The seeds and other parts of violets are occasionally eaten by such birds as the Ruffed Grouse, Wild Turkey, and Mourning Dove, and they are also consumed by the White-Footed Mouse, Pine Mouse, and Eastern Chipmunk. Similarly, the foliage of these low-growing plants is a source of food for the Cottontail Rabbit and Wood Turtle (Clemmys insculpta) [1-6].

dwatta Analgesic Dysentery Poultice An infusion of the plant has been used in the treatment of coughs, colds and dysentery[257]. A poultice of the leaves has been used to reduce the pain of headaches[257]. A poultice of the crushed root has been applied to boils[257].

nrakta Eastern N. America - Quebec to Ontario and south to Georgia. ksacta Wet places, often in open woods[187]. Wet meadows, springs, bogs, swamps etc[43].

propta Seed - best sown in the autumn in a cold frame. Sow stored seed in early spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. Division in the autumn or just after flowering. Larger divisions can be planted out direct into their permanent positions, though we have found that it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame until they are growing away well. Plant them out in the summer or the following spring.

nwatta Prefers a cool moist well-drained humus-rich soil in partial or dappled shade and protection from scorching winds. Very intolerant of drought[187]. Succeeds in dense shade[197]. Tolerates sandstone and limestone soils but becomes chlorotic if the pH is too high. Prefers a pH between 6 and 6.5. This plant produces cleistogamous flowers as well as the usual insect pollinated flowers[187]. It usually self-sows freely[188]. All members of this genus have more or less edible leaves and flower buds, though those species with yellow flowers can cause diarrhoea if eaten in large quantities[62, 85, 159]. A polymorphic species[188]. there are many named forms, selected for their ornamental value[200].

4.2.123 Vaccinium vitis

Cowberry, Lingonberry, Northern mountain cranberry, Cranberry

3 tlin 8 cyuc 3 kcaak 3 tcan 2 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli frusflat
hpa7tmwatli fyfxire7t hjonli

drutta Vaccinium vitis-idaea is an evergreen Shrub growing to 0.3 m (1ft) by 1 m (3ft 3in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in leaf all year, 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 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 soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Tea should not be drunk on a regular basis because it contains the toxin 'arbutin'

kcakta Edible Parts: Fruit Edible Uses: Tea Fruit - raw or cooked[2, 3, 5, 9, 21, 257]. Quite pleasant to eat[7]. An acid flavour, they are used like cranberries in preserves and are considered by many people to be superior to cranberries[183]. The taste is better after a frost[62, 115, 172]. Occasionally the plants bear 2 crops in a year[13]. The fruit is about 6mm in diameter[200]. A tea is made from the leaves[177, 183]. This should not be drunk on a regular basis because it contains the toxin 'arbutin'[9].

tcanta Dye A yellow dye is obtained from the leaves and stems[172]. A purple dye is obtained from the fruit[207]. Can be grown as a ground cover plant[11], spreading by underground runners[188]. It needs weeding for the first year or so[197]. Plants are best spaced about 30cm apart each way[208].

dwatta Antirheumatic Antiseptic Astringent Diuretic Refrigerant V D The leaves are antiseptic, astringent, diuretic, refrigerant[7, 21]. They are used in the treatment of gonorrhoea[218], arthritis, rheumatism, diabetes and diarrhoea[9]. The leaves are gathered in early summer and dried for later use[7]. The mature fruits are eaten fresh or dried as a remedy for diarrhoea[9] and as a treatment for sore throats, coughs and colds[257]. The juice has been gargled as a treatment for sore throats[257].

nrakta Europe, including Britain, from Iceland south and east to the Pyrenees, Macedonia, N. Asia to Japan ksacta Sunny mountain meadows, peat moors and pine woods[7, 17], on acid soils[9].

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 Landscape Uses:Border, Massing, Seashore. Requires a moist but freely-draining lime free soil, preferring one that is rich in peat or a light loamy soil with added leaf-mould[11, 200]. Prefers a very acid soil with a pH in the range of 4.5 to 6, plants soon become chlorotic when lime is present. Succeeds in full sun or light shade though it fruits better in a sunny position[200]. Requires shelter from strong winds[200]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. Sometimes cultivated for its edible fruit, there are some named varieties[183]. 'Koralle' has large and conspicuous berries[182]. The fruit hangs on the plant all winter if it is not picked[183]. The flowers produce a great deal of nectar and are very attractive to bees[7]. Plants in this genus are notably resistant to honey fungus[200].
Special Features:North American native, Edible, Wetlands plant, Attractive flowers or blooms. The plant is heat tolerant in zones 6 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. A clumping mat former. Forming a dense prostrate carpet with a limited spread [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.124 Galium verum

Lady's Bedstraw, Yellow Spring bedstraw, Wirtgen's bedstraw

3 tlin 7 cyuc 3 kcaok 0 tcan 2 dwat 0.6 m hkuc
hmmihtut cyutli kyuctup hwicli hrasjlutnyik hpa7tli flatprik-lwis hpa7tmwatli fyfxre7t hjonli

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

kackta Edible Parts: Leaves Seed**Edible Uses:** Coffee Colouring Curdling agent Drink**Leaves** - raw or cooked[62, 179]. A yellow dye from the flowering stems is used as a food colouring[105, 183]. The roasted seed is a coffee substitute[7]. The seed is also said to be edible[179]. The chopped up plant can be used as a rennet to coagulate plant milks[7, 67, 115, 183, 244]. The flowering tops are distilled in water to make a refreshing acid beverage[2, 183].

tcanta Dye Repellent Strewing StuffingA red dye is obtained from the root[4, 6, 7, 67, 115]. It is rather fiddly to utilize[169]. A yellow dye is obtained from the flowering tops[4, 7, 115]. The dye is obtained from the foliage when it is boiled with alum[207]. The dried plant has the scent of newly mown hay, it was formerly used as a strewing herb[24] and for stuffing mattresses etc[61, 67, 115]. It is said to keep fleas away[207]. A sprig in a shoe is said to prevent blisters[67].

dwatta Antispasmodic Astringent Diuretic Epilepsy Foot care Lithontripic Urinary VulneraryLady's bedstraw has a

long history of use as a herbal medicine, though it is little used in modern medicine. Its main application is as a diuretic and as a treatment for skin complaints[254]. The leaves, stems and flowering shoots are antispasmodic, astringent, diuretic, foot care, lithontripic and vulnerary[4, 7, 9]. The plant is used as a remedy in gravel, stone or urinary disorders[4, 9, 53, 238] and is believed to be a remedy for epilepsy[4, 21]. A powder made from the fresh plant is used to soothe reddened skin and reduce inflammation[7] whilst the plant is also used as a poultice on cuts, skin infections, slow-healing wounds etc[9]. The plant is harvested as it comes into flower and is dried for later use[9]. Both Asperuloside (a terpenoid) and Coumarin (a benzopyrone) occur in some species of Galium. Asperuloside can be converted into prostaglandins (hormone-like compounds that stimulate the uterus and affect blood vessels), making the genus of great interest to the pharmaceutical industry[238].

nrakta Most of Europe, including Britain, to W. Asia. ksacta Waste ground, roadsides etc[7], mainly near the sea[4], on all but the most acid soils[17].

propta Seed - best sown in situ as soon as it is ripe in late summer[200]. The seed can also be sown in situ in the spring though it may be very slow to germinate[200]. Division in spring. The plant can be successfully divided throughout the growing season if the divisions are kept moist until they are established[200]. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Prefers a loose moist leafy soil in some shade, but it tolerates a position in full sun[14]. Plants are tolerant of dry soils[1], but do not thrive in a hot climate. They dislike very acid soils[17, 53]. A very invasive plant[1], though it is low-growing and mixes without harm with any plants at least 60cm tall[K]. It grows well in the summer meadow[24] and is a food plant for the larvae of several species of butterflies[30].

4.2.125 Viola canadensis

Canada Violet, Canadian white violet, Creepingroot violet
3 tlin 8 cyuc 3 kcaok 2 tcan 1 dwat 0.4 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta Viola canadensis is a PERENNIAL growing to 0.4 m (1ft 4in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from April to 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 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.

kackta Edible Parts: Flowers Leaves**Edible Uses:** Tea-Young leaves and flower buds - raw or cooked[62, 177, 183]. A very mild flavour, when boiled as greens they are best mixed with other stronger tasting leaves[183]. When added to soup they thicken it in much the same way as okra[62, 85, 159]. Flowers - raw[62, 85]. The leaves are a good tea substitute[62, 85, 183].

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

dwatta Emetic PoultriceA tea made from the roots has been used in the treatment of pain in the bladder region[222, 257]. The roots and leaves have traditionally been used to induce vomiting, they have also been poulticed and applied to skin abrasions and boils[222].

nrakta N. America - Saskatchewan and south to Nebraska and the Rocky mountains. ksacta Rich soils in deciduous woods and forests in the mountains[43, 62, 187].

propta Seed - best sown in the autumn in a cold frame. Sow stored seed in early spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. Division in the autumn or just after flowering. Larger divisions can be planted out direct into their permanent positions, though we have found that it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame until they are growing away well. Plant them out in the summer or the following spring.

nwatta Easily grown in any fertile soil in full sun or partial shade[233]. Prefers a cool position[233] in a moist well-drained humus-rich soil in partial or dappled shade and protection from scorching winds. Tolerates sandstone and limestone soils but becomes chlorotic if the pH is too high. Prefers a pH between 6 and 6.5. Hardy to about -25°C[187]. All members of this genus have more or less edible leaves and flower buds, though those species with yellow flowers can cause diarrhoea if eaten in large quantities[62, 85, 159]. This species has mainly white flowers that are at first yellowish at the base then turn violet[222]. There are some named varieties selected for their ornamental value[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.126 *Fragaria virginiana*

Scarlet Strawberry, Virginia strawberry
3 tlin 7 cyuc 3 kcaek 2 tcan 2 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hrasjutnyik hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta *Fragaria virginiana* is a PERENNIAL growing to 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 April to May, and the seeds ripen from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Edible Uses: Tea Fruit - raw, cooked or made into preserves[2, 27, 101, 183]. Sweet and succulent. Small but delicious[159]. The fruit is up to 20mm in diameter[200]. The dried leaves are a very pleasant tea substitute[55, 62, 183]. Rich in vitamin C[159].

tcanta Teeth The fruits are used as a tooth cleaner[55, 62]. They are held in the mouth, or rubbed over the teeth, to remove tartar[257]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Antiseptic Astringent Emmenagogue Galactagogue Odontalgic Poultice Vitamin C The whole plant is antiseptic, astringent, emmenagogue, galactagogue and odontalgic[172]. It has been used to regulate the menstrual cycle[172]. A tea made from the leaves has been used as a nerve tonic and is slightly astringent[222]. A poultice made from the dried powdered leaves mixed with oil has been used to treat open sores[257]. A tea made from the roots is diuretic[222]. It has been used in the treatment of diarrhoea, irregular menses, gonorrhoea, stomach and lung ailments[222, 257].

nrakta Eastern N. America - Newfoundland to South Dakota, south to Florida and Oklahoma. ksacta Fields, open slopes and woodland edges[43].

propta Seed - sow early spring in a greenhouse. The seed can take 4 weeks or more to germinate. The seedlings are very small and slow-growing at first, but then grow rapidly. Prick them out into individual pots when they are large enough to handle and plant them out during the summer. Division of runners, preferably done in July/August in order to allow the plants to become established for the following years crop[200]. They can also be moved in the following spring if required, though should not then be allowed to fruit in their first year. The runners can be planted out direct into their permanent positions.

nwatta Prefers a fertile, well-drained, moisture retentive soil in a sunny position[27, 200]. Tolerates semi-shade though fruit production will be reduced when plants grow in such a position. The plants appreciate a mulch of pine or spruce leaves[18]. Along with *F. chiloensis*, this species is probably a parent of the cultivated strawberries. The cultivar 'Little Scarlet' is a form of this species and this is still occasionally cultivated for its fruit in Britain[119]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the

habit and root pattern is also useful and given here if available. An evergreen. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

4.2.127 *Viola labradorica*

Labrador Violet, Alpine violet, Johnny Jump-Up, Alpine Violet
3 tlin 8 cyuc 3 kcaek 2 tcan 0 dwat 0.1 m hkuc
pcimhmimhtut cyutli tcup hwicli hrasjutnyik hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta *Viola labradorica* is an evergreen Perennial growing to 0.1 m (0ft 4in) by 0.3 m (1ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in leaf all year; in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Leaves Edible Uses: Tea Young leaves and flower buds - raw or cooked[105]. A mild flavour, though the leaves soon become quite tough[K]. The leaves make a very acceptable addition to salads[K]. When added to soup they thicken it in much the same way as okra[85, 159]. A tea can be made from the leaves[85].

tcanta A good ground cover plant, fast spreading but slow to thicken up and may need weeding for the first year or so[197]. Plants should be spaced about 30cm apart each way[208]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

nrakta North-eastern N. America - Labrador, south to the mountains of Maine, New Hampshire and New York. ksacta Woods and grassy places[187].

propta Seed - best sown in the autumn in a cold frame. Sow stored seed in early spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. Division in the autumn or just after flowering. Larger divisions can be planted out direct into their permanent positions, though we have found that it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame until they are growing away well. Plant them out in the summer or the following spring.

nwatta Landscape Uses: Border, Ground cover, Rock garden, Woodland garden. Cool moist well-drained humus-rich soil in partial or dappled shade and protection from scorching winds. Succeeds in dense shade[197]. Tolerates sandstone and limestone soils but becomes chlorotic if the pH is too high. Prefers a pH between 6 and 6.5. Hardy to about -25°C[187]. There are some named varieties selected for their ornamental value[200]. All members of this genus have more or less edible leaves and flower buds, though those species with yellow flowers can cause diarrhoea if eaten in large quantities[62, 85, 159]. Special Features: Attractive foliage, North American native, Naturalizing, Attracts butterflies, Suitable for cut flowers. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2].

4.2.128 *Polygonum viviparum*

Alpine Bistort
3 tlin 7 cyuc 3 kcaek 0 tcan 1 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hrasjutnyik hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta *Polygonum viviparum* is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June 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. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can

more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

pcista Although no specific mention has been made for this species, there have been reports that some members of this genus can cause photosensitivity in susceptible people. Many species also contain oxalic acid (the distinctive lemony flavour of sorrel) - whilst not toxic this substance can bind up other minerals making them unavailable to the body and leading to mineral deficiency. Having said that, a number of common foods such as sorrel and rhubarb contain oxalic acid and the leaves of most members of this genus are nutritious and beneficial to eat in moderate quantities. Cooking the leaves will reduce their content of oxalic acid. People with a tendency to rheumatism, arthritis, gout, kidney stones or hyperacidity should take especial caution if including this plant in their diet since it can aggravate their condition[238].

kcakta Edible Parts: Leaves Root Seed Edible Uses: Leaves - raw or cooked[62, 172]. They have a pleasant tart taste when cooked[85]. Seed - raw or cooked[172]. The seed is not often produced and even when it is, it is rather small and fiddly to utilize. It is rich in starch[91]. It is pickled in Nepal[272]. Root - raw or cooked[2, 61, 62, 91]. Starchy and pleasant but rather small[85, 161, 172]. Sweet, nutty and wholesome[183]. They taste best when roasted[183]. Bulbils from lower part of flowering stem - raw[62].

dwatta Astringent Styptic The root is astringent and styptic[172, 240]. It is used in the treatment of abscesses, as a gargle to treat sore throats and spongy gums, and as a lotion for ulcers[240].

nrakta Arctic and northern regions of Europe, including Britain, Asia and America. On mountains in south. ksacta Mountain grassland and wet rocks[17].

propta Seed - sow spring in a cold frame. Germination is usually free and easy. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer if they have reached sufficient size. If not, overwinter them in a cold frame and plant them out the following spring after the last expected frosts. Division in spring or autumn. Very easy, larger divisions can be planted out direct into their permanent positions. We have found that it is better to pot up the smaller divisions and grow them on in light shade in a cold frame until they are well established before planting them out in late spring or early summer.

nwatta Succeeds in an ordinary garden soil[1] but prefers a moisture retentive not too fertile soil in sun or part shade[200]. Repays generous treatment[1]. Plants seem to be immune to the predations of rabbits[233]. Plants do not often produce viable seed, reproducing by means of bulbils formed on the lower portion of the flowering stem. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.129 Ribes fragrans

3 tlin 7 cyuc 3 kcaok 0 tcan 0 dwat 0.6 m hkuc hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprklwis hpa7tmwatli xre7t hjonli

drutta Ribes fragrans is a deciduous Shrub growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 3. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[177]. A gooseberry with a sweet and pleasant flavour[2, 105]. The fruit is about 8mm in diameter[200].

nrakta E. Asia - Mongolia, Siberia. ksacta Mountain slopes among rocks and on stony taluses to lower parts of the bald mountain zone[74].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 4 - 5 months cold stratification at between 0 to 9°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or

more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, 10 - 15cm with a heel, July/August in a frame[78, 113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

nwatta Easily grown in a moisture retentive but well-drained loamy soil of at least moderate quality[11, 200]. Plants are quite tolerant of shade though do not fruit so well in such a position[11]. Hardy to about -20°C[200]. The whole plant is aromatic with a smell reminiscent of balm[200]. This species is closely related to *R. hudsonianum*[200]. Plants can harbour a stage of 'white pine blister rust', so they should not be grown in the vicinity of pine trees[155]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.130 Geum rivale

Water Avens, Purple avens

3 tlin 7 cyuc 3 kcaok 1 tcan 2 dwat 0.3 m hkuc hmimhtut cyutli tcupjha7n hwicli hrasjlutnyik hpa7tli flatprklwis hpa7tmwatli fyifxre7t hjonli

drutta *Geum rivale* is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to September, and the seeds ripen from June to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil.

kcakta Edible Parts: Edible Uses: Chocolate Condiment Drink The dried or fresh root can be boiled in water to make a delicious chocolate-like drink[85, 95, 106, 183, 213]. It can also be used as a seasoning[102, 183]. It is best harvested in the spring or autumn but can be used all year round[213]. Fragrant[161], it was once used to flavour ales[2, 183].

tcanta Repellent The dried root repels moths. Plants are suitable for ground cover when spaced about 30cm apart each way[208]. The cultivar 'Leonard's Variety' is the best for this purpose[208].

dwatta Antidiarrhoeal Antiinflammatory Antiseptic Aromatic Astringent Diaphoretic Febrifuge Stomachic Styptic Tonic The root is anti-inflammatory, antiseptic, aromatic, astringent, diaphoretic, febrifuge, stomachic, styptic and tonic[4, 21]. An infusion is taken internally in the treatment of diarrhoea (and is suitable for children to use), intestinal and stomach complaints, liver disorders etc, it is also applied externally as a wash to various skin afflictions - it is said to remove spots, freckles and eruptions from the face[4, 9]. This plant has similar properties but is less active than the related *G. urbanum* and so is seldom used medicinally[9, 238]. The root is best harvested in the spring, since at this time it is most fragrant[4]. Much of the fragrance can be lost on drying, so the root should be dried with great care then stored in a cool dry place in an airtight container, being sliced and powdered only when required for use[4]. The root is rich in tannin and is a powerful astringent[213, 222].

nrakta Europe, including Britain, from Iceland south and east to Spain, Siberia and W. Asia. N. America. ksacta Damp places, such as moist ditches and streamsides, most frequently in the shade[9, 17].

propta Seed - sow spring or autumn in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. Division in spring or autumn. This should be done every 3 - 4 years in order to maintain the vigour of the plant[200]. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Easily grown in any moderately good garden soil that is well-drained[1]. Easily grown in a moist or shady border[28, 187]. Prefers a soil rich in organic matter[200]. Prefers a base rich soil[17]. Hybridizes freely with other members of this genus, especially with *G. urbanum*[187]. There are some named varieties selected for their ornamental value[208, 233]. 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].

4.2.131 *Streptopus streptopoides*

Small twycedstakl

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat 0.3 m hkuc
pcimhmim cyutli tcup hwicli hrasjlut hpa7tli flatpriklwis
hpa7tmwatli hjonli

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

kcakta Edible Parts: Fruit Leaves Edible Uses: Young leaves and shoots - raw or cooked. A cucumber flavour[172]. Fruit - raw or cooked. A watermelon flavour[172]. The orange-red berries are about 6mm in diameter[270].

nrakta E. Asia - China, Japan, Korea. North-western N. America. *ksacta* Dense coniferous mid-montane woods[60]. Moist woods, river banks and alder thickets[172].

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

nwatta Requires a cool leafy soil in shade or partial shade[200]. Thrives in a moist light soil containing organic matter[1]. Hardy to at least -20°C.

4.2.132 *Larix decidua*

Larch, European Larch, Common Larch

3 tlin 6 cyuc 2 kcaak 0 tcan 3 dwat 45 m hkuc
htut cyutli tcup hwicli hyishrasjlut hpa7tli frusflatpriklwis
hpa7tmwatli hjonli

drutta *Larix decidua* is a deciduous Tree growing to 45 m (147ft) by 15 m (49ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from April to May, and the seeds ripen from October 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 Wind. 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 acid soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate maritime exposure. It cannot tolerate atmospheric pollution.

pcista care with lactose intolerance as contains galactose. Inhalation may cause acute inflammation airways. Possible allergies (e.g. hives, rashes, contact dermatitis), Oral

intake of bark or oil application over large skin areas may cause kidney damage [301].

kcakta Edible Parts: Inner bark Manna Edible Uses: Inner bark - it can be eaten raw or can be dried, ground into a powder and used with cereal flours in making bread etc[2, 177]. A sweet-tasting manna is obtained from the trunk, it can be eaten raw but is mainly used medicinally[2, 7, 46, 61, 105]. Another report says that 'Briancon manna' is exuded from the leaves in the summer[4]. It is white, sweet and almost odourless[4].

tcanta Pioneer Resin Tannin Wood Large quantities of resin are obtained by tapping the trunk[4]. Small holes are bored into the trunk, most resin being obtained from near the centre of the trunk[171]. When properly made, the same borehole can be used for 20 - 30 years[64]. The resin has a wide range of uses including wood preservatives, varnish, medicinal etc[4, 64]. It needs no preparation other than straining through a cloth to remove plant debris etc[4]. The hole is made in the spring and the resin extracted in the autumn[64]. Resin can be extracted from May to October[4]. The yield is about 40 grams per tree[64]. A fast-growing tree that establishes itself rapidly and is also said to improve the quality of the soil, the larch can be used as a pioneer species on cleared and exposed land in order to assist the establishment of other woodland trees[4]. The bark contains tannin[171]. This is much utilized in N. Europe[223], though in Britain the oak is considered to be a better source[4]. On a 10% moisture basis, the bark contains 11.6% tannin[223]. Wood - durable, tough, elastic, easy to split, takes a good polish[4, 46, 61, 81]. Larch produces one of the toughest woods obtained from conifers and is also resistant to woodworm[4]. It is widely used in construction, for railway sleepers, cabinet work etc[4, 46, 61, 81].

dwatta Anthelmintic Antidote Antirheumatic Antiseptic Astringent Bach Balsamic Diuretic Eczema Expectorant Haemostatic Laxative Rubefacient Stimulant Vermifuge Vulnerary The bark, stripped of its outer layer, is astringent, balsamic, diuretic, expectorant, stimulant and vulnerary[4, 21]. Its main application is as an expectorant in chronic bronchitis and has also been given internally in the treatment of haemorrhage and cystitis[4, 238]. A cold extract of the bark is used as a laxative[9]. As an external application, it is useful in the treatment of chronic eczema and psoriasis[4]. The powdered bark can be used on purulent and difficult wounds to promote their healing[21]. The bark is harvested in the spring and should be dried rapidly[4]. The turpentine obtained from the resin is antiseptic, balsamic, diuretic, haemostatic, rubefacient and vermifuge[4, 238]. It is a valuable remedy in the treatment of kidney, bladder and rheumatic affections, and also in diseases of the mucous membranes and the treatment of respiratory complaints[4]. Other reports say that it is contraindicated for anyone with a kidney complaint[7, 238]. Externally, the turpentine is used in the form of liniment plasters and inhalers[4]. It has also been suggested for combating poisoning by cyanide or opium[4]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Lack of confidence', 'Anticipation of failure' and 'Despondency [209]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Larix decidua* for fevers and colds, coughs/bronchitis, tendency to infection, blood pressure problems, inflammation of mouth and pharynx, common cold (see [302] for critics of commission E).

nrakta C. Europe - Alps to N. Russia and Siberia. Naturalized in Britain. *ksacta* Forms extensive open forests at high altitudes[81].

propta Seed - sow late winter in pots in a cold frame. One month cold stratification helps germination[113]. It is best to give the seedlings light shade for the first year[78]. As soon as they are large enough to handle, prick out the seedlings into individual pots. Although only a few centimetres tall, they can be planted out into their permanent positions in the summer providing you give them an effective weed-excluding mulch and preferably some winter protection for their first year. Otherwise grow them on in the cold frame for their first winter and plant them out in early summer of the following year. The seed remains viable for 3 years[113] If you are growing larger quantities of plants, you can sow the seed in an outdoor seedbed in late winter. Grow on the seedlings in the seedbed for a couple of years until they are ready to go into their permanent positions then plant them out during the winter.

nwatta Landscape Uses: Specimen. Prefers an open airy position in a light or gravelly well-drained soil[11, 200]. It tolerates acid and infertile soils, though it dislikes very peaty or very chalky soils[11]. Another report says that it tolerates chalky soils[200]. Succeeds on rocky hill or mountain sides and slopes[200]. Tolerates salt-laden gales according to one report[75] whilst another says that it dislikes exposed positions[11]. The larch dislikes atmospheric pollution and so does not grow well in towns[185]. A north or east aspect is more suitable than west or south[11]. It dislikes growing in wet ground or frost pockets[11, 81], and grows best in areas with abundant rainfall[11]. The larch is a very ornamental tree that is widely grown for forestry[11, 81]. It is very fast growing with new annual growth of 1.5 metres often found and trees can average 60cm or more for many years[185]. The dormant trees are very cold hardy, but they are often excited into premature growth in Britain by mild spells during the winter, the plants are then subject to damage by late frosts and cold winds[1, 185]. The young shoots have a delicate mossy fragrance as the leaves unfold[245]. Hybridizes freely with other members of this genus. Open ground plants, 1 year x 1 year are the best for planting out, do not use container grown plants with spiralled roots[200]. Plants transplant well, even when coming into growth in the spring[200]. Plants in this genus are notably resistant to honey fungus[81, 200]. Special Features: Not North American native, Attractive flowers or blooms.

4.2.133 *Populus deltoides*

Eastern Cottonwood, Plains cottonwood, Rio Grande cottonwood, Necklace Poplar

3 tlin 9 cyuc 2 kcaak 4 tcan 2 dwat 30 m hkuc
htut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli nyanhjen hjonli

drutta *Populus deltoides* is a deciduous Tree growing to 30 m (98ft) by 20 m (65ft) at a fast rate. See above for USDA hardness. It is hardy to UK zone 2. It is in flower from March to April, and the seeds ripen from May to June. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Inner bark Leaves Seed Edible Uses: Inner bark[105, 161, 177, 257]. A mucilaginous texture, it is usually harvested in the spring[257]. There are no more details but inner bark is often dried, ground into a powder and then used as a thickener in soups etc or added to cereals when making bread. Seeds[105, 161, 177]. No more details are given but they are very small and would be exceedingly fiddly to collect and use. Sap - used for food[257]. Buds[105, 161, 177]. No more details are given. The leaves are rich in protein and have a greater amino-acid content than wheat, corn, rice and barley[226]. A concentrate made from them is as nourishing as meat, but can be produced faster and more cheaply[226]. Some people believe that this will become a major food source for humans[226].

tcanta Biomass Dye Pioneer Rooting hormone Shelterbelt Soil stabilization Wood An extract of the shoots can be used as a rooting hormone for all types of cuttings. It is extracted by soaking the chopped up shoots in cold water for a day[172]. Various dyes can be obtained from the leaf buds in the spring - green, white, yellow, purple and red have been mentioned[257]. Trees are planted for dune fixing in erosion control programmes[149, 227]. They are also good pioneer species, growing quickly to provide a good habitat for other woodland trees and eventually being out-competed by those trees[229]. A fairly wind resistant tree, it can be grown as part of a shelterbelt planting[200, 269]. Another report says that it is easily storm-damaged[227]. The wood has been used as a bio-mass for producing methanol, which can be used to power internal combustion engines[226]. Annual yields of 7 tonnes of oven-dry material per year have been achieved[269]. Wood - weak, soft, rather woolly in texture, without smell or taste, of low flammability, not durable, very resistant to abrasion but warps and shrinks badly[11,

149, 171, 227]. It weighs 24lb per cubic foot[235]. The wood takes paint well, is easy to glue and nail[227]. It is used principally for lumber, pulp, crates, veneer etc[11, 149, 171].

dwatta Anodyne Anthelmintic Anti-inflammatory Antiscorbutic Blood purifier Febrifuge Poulitice Tonic The bark contains salicin, a glycoside that probably decomposes into salicylic acid (aspirin) in the body[222, 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]. An infusion of the bark has been used in the treatment of whooping cough and tuberculosis[257]. A decoction of the bark has been used to rid the body of intestinal worms[257]. The bark has been eaten as a treatment for colds[257]. A tea made from the inner bark is used in the treatment of scurvy[222]. The inner bark, combined with black haw bark (*Crataegus douglasii*) and wild plum bark (*Prunus* spp) has been used as a female tonic[222, 257]. A poultice of the leaves has been used as a treatment for rheumatism, bruises, sores and boils[257].

nrakta N. America - Quebec to Florida, west to Minnesota and Texas. ksacta Rich moist soils, mainly along riverbanks, bottoms and rich woods[43, 227].

propta Seed - must be sown as soon as it is ripe in spring[113]. Poplar seed has an extremely short period of viability and needs to be sown within a few days of ripening[200]. Surface sow or just lightly cover the seed in trays in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the old frame. If sufficient growth is made, it might be possible to plant them out in late summer into their permanent positions, otherwise keep them in the cold frame until the following late spring and then plant them out. Most poplar species hybridize freely with each other, so the seed may not come true unless it is collected from the wild in areas with no other poplar species growing[11]. Cuttings of mature wood of the current season's growth, 20 - 40cm long, November/December in a sheltered outdoor bed or direct into their permanent positions. Very easy. Suckers in early spring[78].

nwatta Industrial Crop: Biomass Management: Coppice Management: Standard Minor Global Crop Other Systems: Irreg. Intercrop Other Systems: Strip intercrop Landscape Uses: Erosion control, Aggressive surface roots possible. An easily grown plant, it does well in a heavy cold damp soil[1, 269] but thrives best on moist well-drained, fine sandy loams or silts close to streams[269]. Prefers a deep rich well-drained circumneutral soil, growing best in the south and east of Britain[11, 200]. Growth is much less on wet soils, on poor acid soils and on thin dry soils[11]. It does not do well in exposed upland sites[11]. It dislikes shade and is intolerant of root or branch competition[200]. Tolerates both hot and cool summers[200]. Fairly wind-tolerant[200]. The tree is reported to tolerate an annual precipitation in the range of 60 to 150cm, an annual temperature in the range of 8 to 14°C, and a pH of 4.5 to 8[269]. A fast-growing but short-lived tree[227, 229, 274]. It can make new shoots up to 1.5 metres long each year[274] and is often planted for timber in Europe[50]. It does have drawbacks, though, since it is easily storm-damaged, is easily damaged by fire when young and is much attacked by fungi[227]. Like the quaking aspen (*Populus tremuloides*) the leaves of this species rustle even in light breezes[274]. The trees can be coppiced[149], sprouting freely from the base of the trunk and the roots if they are cut down[227]. Poplars have very extensive and aggressive root systems that can invade and damage drainage systems. Especially when grown on clay soils, they should not be planted within 12 metres of buildings since the root system can damage the building's foundations by drying out the soil[11]. Dioecious. Male and female plants must be grown if seed is required. Hybridizes freely with other members of this genus[200]. Special Features: North American native, Naturalizing, Wetlands plant, Inconspicuous flowers or blooms.

4.2.134 *Parthenocissus quinquefolia*

Virginia Creeper, Woodbine

3 tlin 10 cyuc 2 kcaak 0 tcan 2 dwat 30 m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Parthenocissus quinquefolia* is a deciduous Climber growing to 30 m (98ft 5in) at a fast rate. See

above for USDA hardness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to August, and the seeds ripen from October to November. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It can tolerate atmospheric pollution.

pcista Skin contact with the leaves in autumn can cause dermatitis in some people[222]. The tissues of the plant contain microscopic, irritating needle-like crystals called raphides[274]. Some evidence suggests the berries are poisonous [301].

kcakta Edible Parts: Fruit Root StemEdible Uses: Fruit - raw[105, 161]. The fruit is not very well flavoured, nor is it produced very freely[K]. The fruit is about 6mm in diameter[200] and is carried in small bunches like grapes[K]. Stalks - cooked. They should be peeled and then boiled[105, 161]. The stalks are cut, boiled and peeled, and the sweetish substance between the bark and the wood is used for food[257]. Root - cooked[257].

tcanta DyeA pink dye is obtained from the fruit[46, 61, 257]. The plant can be allowed to fall down banks and make a spreading ground cover[202]. They are best spaced about 3 metres apart each way[208]. They are very vigorous, however, and would soon swamp smaller plants[K].

dwatta Alternative Astringent Diuretic Expectorant TonicThe bark and fresh young shoots are aperient, alterative, emetic, expectorant and tonic[46, 61]. A hot decoction can be used as a poultice to help reduce swellings[257]. A tea made from the leaves is aperient, astringent and diuretic[222]. It is used as a wash on swellings and poison ivy rash[222, 257]. A tea made from the plant is used in the treatment of jaundice[222, 257]. A tea made from the roots is used in the treatment of gonorrhoea and diarrhoea[222, 257]. The fruit is useful in treating fevers[4]. Some evidence suggests the berries (due to oxalic acid content)are poisonous [301].

nrakta Eastern N. America - Quebec to Florida and Mexico. A garden escape in Britain. ksacta Woods and rocky banks[43].

propta Seed - best sown as soon as it is ripe in a cold frame[200]. Stored seed requires stratifying for 6 weeks at 5°C and should be sown as early in the year as possible[200]. Germination is variable. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 7 - 10cm taken at a node (ensure that it has at least 2 true buds), July/August in a frame[78]. Easy to root but they do not always survive the first winter[182]. Basal hardwood cuttings of current seasons growth, 10 - 12 cm long, autumn in a frame[200]. Layering[200]. Plants often self-layer[202].

nwatta Landscape Uses:Arbor, Woodland garden. Requires a well-drained moisture retentive fertile soil[200]. Succeeds in most soils, preferring full sun but tolerating semi-shade[202]. Best if grown in semi-shade on an east or west facing wall[200]. Tolerates atmospheric pollution[4]. Dormant plants are hardy to about -25°C[200], though the young growth in spring can be damaged by late frosts. A very ornamental plant[11], it is self-supporting on walls by means of adhesive tendrils[11, 182]. Very fast growing, though it often does not grow very much in its first year or two after planting out[202]. When established, it can send out new growth 6 metres long in a year[4]. The plant can, however, become a nuisance by climbing into gutters[182]. Plants are very tolerant of trimming and can be cut right back to the base if required to rejuvenate the plant[202]. Any pruning is best carried out in the spring[219]. The fruit is normally only produced after a long hot summer[219]. There are several named varieties[182]. Special Features:Attracts birds, North American native, Inconspicuous flowers or blooms.

4.2.135 *Ulmus americana*

American Elm, Gray Elm, Water Elm
3 tlin 9 cyuc 2 kcak 0 tcan 2 dwat 25 m hkuc
hmmihmtut cyutli tcup hwicli hrasjltunyk hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta *Ulmus americana* is a deciduous Tree growing to 25 m (82ft) by 25 m (82ft) at a medium rate. See above for USDA hardness. It is hardy to UK zone 3 and is not frost tender. It is in flower in May, and the seeds ripen in June. 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.

kcakta Edible Parts: LeavesEdible Uses: CoffeeLeaves - raw or cooked. The red inner bark has been used to make a coffee-like drink[257].

tcanta Containers Paper String WoodA fibre obtained from the stems is used in making paper[189]. The stems are harvested in spring, the leaves are removed and the stems steamed until the fibres can be stripped. The outer bark is removed from the inner bark by scraping or peeling. The fibres are cooked for 2 hours with lye and then beaten with mallets. The paper is beige in colour[189]. The inner bark is very fibrous and is used in making string and strong ropes[149, 226]. The bark has been used to make various containers, including those used for gathering maple syrup[226]. Wood - hard, strong, heavy, durable, coarse grained, shrinks moderately though it tends to warp and twist, it bends well and is difficult to split. The wood is very durable in water. It weighs 40lb per cubic foot and is harvested commercially for flooring, wheel hubs, cooperage, agricultural implements and many other uses[46, 61, 82, 149, 171, 226, 227].

dwatta Antispasmodic Astringent Birthing aid Dysentery Haemostatic SalveAn infusion made from the bark has been used in the treatment of bleeding from the lungs, ruptures, coughs, colds, influenza, dysentery, eye infections, cramps and diarrhoea[226, 257]. An infusion of the bark has been taken by pregnant women to secure stability of children[257]. A decoction of the bark has been used as a wash on wounds[257]. A decoction of the inner bark has been taken in the treatment of severe coughs, colds, menstrual cramps[257]. An infusion of the inner bark has been drunk, and used as a bath, in the treatment of appendicitis[257]. An infusion of the root bark has been used in the treatment of coughs, colds and excessive menstruation[257]. A decoction has been used as an eye wash in the treatment of sore eyes[257]. The inner bark has been used as an emollient on tumours[257].

nrakta Eastern N. America - Newfoundland to Manitoba, Florida and Texas. ksacta Rich soils, especially by streams and in lowlands[43, 82]. Found on a range of soil types, from acidic to mildly alkaline[229].

propta Seed - if sown in a cold frame as soon as it is ripe, it usually germinates within a few days[200]. Stored seed does not germinate so well and should be sown in early spring[200]. The seed can also be harvested 'green' (when it has fully developed but before it dries on the tree) and sown immediately in a cold frame. It should germinate very quickly and will produce a larger plant by the end of the growing season[80]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Plants should not be allowed to grow for more than two years in a nursery bed since they form a tap root and will then move badly. Layering of suckers or coppiced shoots[200].

nwatta Landscape Uses:Firewood, Aggressive surface roots possible, Specimen, Street tree. Prefers a fertile soil in full sun[188], but it can be grown in any soil of at least moderate quality so long as it is well drained[1]. Trees are moderately fast-growing and live for at least 300 years in the wild[227, 229], but they do not thrive in Britain[1]. This species is particularly susceptible to 'Dutch elm disease'[274], a disease that has destroyed the greater part of all the elm trees growing in Britain. The disease is spread by means of beetles. Mature trees killed back by the disease will often regrow from suckers, but these too will succumb when they get larger. There is no effective cure (1992) for the problem, but most E. Asian, though not Himalayan, species are resistant (though not immune) to the disease so the potential exists to use these resistant species to develop new resistant hybrids with the native species[200]. The various species of this genus hybridize freely with each other and pollen is easily saved, so even those species with different flowering

times can be hybridized[200]. Special Features:North American native, Inconspicuous flowers or blooms.

4.2.136 Pinus sylvestris

Scot's Pine, Scotch Pine

3 tlin 7 cyuc 2 kcaak 5 tcan 3 dwat 25 m hkuc
hmimhtut cyutli hgatkycuctcuphja7n hwicli hyishrasjlut
hpa7tli frusflatprklwisslip hpa7tmwatli dyat hjonli

drutta Pinus sylvestris is an evergreen Tree growing to 25 m (82ft) by 10 m (32ft) at a fast rate. See above for USDA hardness. It is hardy to UK zone 2. It is in leaf all year, in flower in May, and the seeds ripen from March to June. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. 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 acid and very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry moist or wet soil and can tolerate drought. The plant can tolerate maritime exposure. It can tolerate atmospheric pollution.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222].
kcakta Edible Parts: Inner barkEdible Uses: CondimentInner bark - dried and ground into a powder and used in making bread[2, 66, 105, 177]. It is often mixed with oatmeal[115]. A famine food, it is only used when all else fails[115]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Dye Essential Fibre Fuel Herbicide Lighting Packing Resin Shelterbelt WoodA tan or green dye is obtained from the needles[168]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. A reddish yellow dye is obtained from the cones[6]. This tree yields resin and turpentine[64, 66, 100, 171]. 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. An essential oil obtained from the leaves is used in perfumery and medicinally[46, 61]. A fibre from the inner bark is used to make ropes[115]. The roots are very resinous and burn well. They can be used as a candle substitute[115]. The leaves are used as a packing material[46]. The fibrous material is stripped out of the leaves and is used to fill pillows, cushions and as a packing material[7]. Trees are very wind resistant and quite fast growing. They can be planted as a shelterbelt, succeeding in maritime exposure[75, 200]. Wood - light, soft, not strong, elastic, durable, rich in resin. Used in construction, furniture, paper manufacture etc.[13, 46, 100]. A good fuel but it is somewhat smokey[6, 66, 115].

dwatta Antirheumatic Antiseptic Aromatherapy Bach Balsamic Diuretic ExpectorantScot's pine has quite a wide range of medicinal uses, being valued especially for its antiseptic action and beneficial effect upon the respiratory system. It should not be used by people who are prone to allergic skin reactions whilst the essential oil should not be used internally unless under professional supervision[254]. The turpentine obtained from the resin is antirheumatic, antiseptic, balsamic, diuretic, expectorant, rubefacient and vermifuge[4, 13, 46]. It is a valuable remedy in the treatment of kidney, bladder and rheumatic affections, and also in diseases of the mucous membranes and the treatment of respiratory complaints[4]. Externally it is used in the form of liniment plasters and inhalers[4]. The leaves and young shoots are antiseptic, diuretic and expectorant[9]. They are harvested in the spring and dried for later use[9]. They are used

internally for their mildly antiseptic effect within the chest and are also used to treat rheumatism and arthritis[254]. They can be added to the bath water for treating fatigue, nervous exhaustion, sleeplessness, skin irritations[9]. They can also be used as an inhalant in the treatment of various chest complaints[9]. The essential oil from the leaves is used in the treatment of asthma, bronchitis and other respiratory infections, and also for digestive disorders such as wind[254]. An essential oil obtained from the seed has diuretic and respiratory-stimulant properties[254]. The seeds are used in the treatment of bronchitis, tuberculosis and bladder infections[254]. A decoction of the seeds can be applied externally to help suppress excessive vaginal discharge[254]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Self-reproach', 'Guilt feelings' and 'Despondency'[209]. The essential oil is used in aromatherapy. Its keyword is 'Invigorating'[210].

nrakta Europe, including Britain, from Scandinavia south and east to Spain, Albania and temperate Asia. ksacta Forming woods in the mountains of Scotland[7, 9].

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 Industrial Crop: Hydrocarbon Management: Standard Regional TimberLandscape Uses:Christmas tree, Specimen. Thrives in a light well-drained sandy or gravelly loam[1, 11]. Trees grow well on poor dry sandy soils[11, 81]. Fairly shade tolerant[186]. Prefers a light acid soil, becoming chlorotic at a pH higher than 6.5[186]. Trees can succeed for many years on shallow soils over chalk[185]. Tolerates chalk for a while, but trees are then short-lived[81]. Tolerates some water-logging[186]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[186]. Very wind resistant[49, 75], tolerating maritime exposure[166]. Tolerates atmospheric pollution[226]. Fairly long-lived, to 200 years or more and quite fast growing[185], but trees are very slow growing in wet soils[81]. Young trees can make new growth of 1 metre a year though growth slows down rapidly by the time the tree is 18 metres tall[185]. This species is extensively used in cool temperate forestry as a timber tree[200]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. Cones take two seasons to ripen[7]. Plants are easily killed by fire and cannot regenerate from the roots[186]. A good food plant for the caterpillars of several species of butterflies[30]. This tree has over 50 species of associated insects[81]. Leaf secretions inhibit the germination of seeds, thereby reducing the amount of plants that can grow under the trees[18]. There are several named forms selected for their ornamental value[188]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Not North American native, Naturalizing, Inconspicuous flowers or blooms.

4.2.137 Acer platanoides

Norway Maple, Harlequin Maple

3 tlin 7 cyuc 2 kcaak 3 tcan 0 dwat 21 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnykfrip hpa7tli flatprklwisslip hpa7tmwatli hjonli

drutta Acer platanoides is a deciduous Tree growing to 21 m (69ft) by 15 m (49ft) at a fast rate. See above for USDA hardness. It is hardy to UK zone 3. It is in flower from April to May, and the seeds ripen from 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 Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: SapEdible Uses: SweetenerThe sap contains a certain amount of sugar and can either be used as a drink, or can be concentrated into a syrup by boiling off the water[4, 105, 177]. The syrup is used as a sweetener on many foods. The concentration of sugar is considerably lower than in the sugar maples (*A. saccharum*)[2]. The tree trunk is tapped in the early spring, the sap flowing better on warm sunny days following a frost. The best sap production comes from cold-winter areas with continental climates.

tcanta Dye Preservative Shelterbelt WoodThe leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. The trees are fairly wind tolerant and are often used in to give protection from the wind in mixed shelterbelts[200]. They are fast-growing and rapidly produce a screen[200]. A rose coloured dye is obtained from the bark[57]. Wood - hard, heavy, fine grained. Used for small domestic items[4, 13, 46, 61].

nrakta Europe, from Scandinavia to the Urals and the Mediterranean, east to W.Asia. Naturalized in Britain. ksacta Grows on all but very poor soils in Britain[17].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter. Cultivars can be budded onto rootstocks of the species. Any grafting is best carried out in September rather than February.

nwatta Landscape Uses:Firewood, Aggressive surface roots possible, Pollard, Screen. Of easy cultivation, it prefers a good moist well-drained soil but thrives in any soil[11, 17]. Grows well in heavy clay soils. Prefers a sunny position but tolerates some shade[11, 200]. One report says that plants tolerate chalky soils[200], but another says that plants can develop chlorosis as a result of iron deficiency when they are grown in alkaline soils. Trees are very tolerant of atmospheric pollution[226]. The Norway maple is a quick-growing tree that has been widely planted in Britain and is more or less naturalized. There are many named forms that have been selected for their ornamental value[11]. Norway maple is a bad companion plant, inhibiting the growth of nearby plants[18, 20]. The leaves are seldom eaten or defaced by insects because the tree contains a sharp milky juice that they dislike[4]. Trees take 30 years to produce seed[98]. Special Features: Not North American native, Invasive, Naturalizing, Attractive flowers or blooms.

4.2.138 *Picea pungens*

Blue Spruce, Colorado Spruce

3 tlin 7 cyuc 2 kcak 0 tcan 0 dwat 20 m hkuc

htut cyutli kyucyuc hwicly hvihsrasjlutnyik hpa7tli frusflat-prik hpa7mwatli hjonli

drutta *Picea pungens* is an evergreen Tree growing to 20 m (65ft) by 5 m (16ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf all year, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female,

but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure. It cannot tolerate atmospheric pollution.

kcakta Edible Parts: Flowers Inner bark SeedEdible Uses: TeaYoung male catkins - raw or cooked. Used as a flavouring[172]. Immature female cones - cooked. The central portion, when roasted, is sweet and syrupy[172]. The cones are about 7cm long[82]. Inner bark - dried, ground into a powder and then used as a thickener in soups etc or added to cereals when making bread[172]. An emergency food, it is only used when all else fails. Seed - raw[172]. The seed is about 2 - 4mm long[229]. It is rich in fats and has a pleasant slightly resinous flavour but is too small and fiddly to be worthwhile unless you are desperate[172, K]. A refreshing tea, rich in vitamin C, can be made from the young shoot tips[172].

tcanta Shelterbelt WoodA fairly wind resistant tree, it can be grown as part of a shelterbelt planting[200]. Wood - light, soft, close grained, weak, brittle and often full of knots[82, 171, 229]. The wood has little commercial value[226], but is used for construction[82] and is also valued for its use in the pulp industry to make paper[171].

nrakta South-western N. America - Rocky Mountains. ksacta Banks of streams or on first benches above them, singly or in small groves, 2000 - 3300 metres[82].

propta Seed - stratification will probably improve germination so sow fresh seed in the autumn in a cold frame if possible[80]. Sow stored seed as early in the year as possible in a cold frame[78]. A position in light shade is probably best[78]. Seed should not be allowed to dry out and should be stored in a cool place[80]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the greenhouse or cold frame for their first winter. They can be planted out into their permanent positions in early summer of the following year, or be placed in an outdoor nursery bed for a year or so to increase in size. They might need protection from spring frosts. Cuttings of semi-ripe terminal shoots, 5 - 8cm long, August in a frame. Protect from frost. Shoots roots in the spring[78]. Cuttings of mature terminal shoots, 5 - 10cm long, September/October in a cold frame. Takes 12 months[78]. Cuttings of soft to semi-ripe wood, early summer in a frame. Slow but sure.

nwatta Landscape Uses:Christmas tree, Firewood, Screen, Specimen. Likes abundant moisture at the roots, if grown in drier areas it must be given a deep moist soil[11]. Tolerates poor peaty soils[200]. Prefers a cold dry high mountain site[200]. Succeeds in wet cold and shallow soils but is not very wind-firm in shallow soils[1]. Resists wind exposure to some degree[200]. This species has a deeply penetrating root system that firmly anchors the tree against winds[229]. Prefers a pH between 4 to 6[200]. Dislikes shade[200]. Intolerant of atmospheric pollution[11]. A long-lived but slow-growing tree in the wild, with specimens 800 years old recorded[229]. It is planted as a timber tree in N. and C. Europe[50]. Most trees in Britain are grafted and these are slow growing[185]. The few trees of seedling origin tend to be fairly fast growing after a slow start[185]. Annual increases of 30 - 40cm are not uncommon in some of the larger trees. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Seed production is usually good, with heavy crops every 2 - 3 years[229]. In some upland areas, especially over granitic or other base-poor soils, growth rate and health have been seriously affected by aluminium poisoning induced by acid rain[200]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. There are several named forms, selected for their ornamental value[188]. Trees are very subject to severe damage by aphids in mild winter areas where temperatures do not regularly fall below -8°C[200]. All parts of the plant emit a powerful pungent smell when bruised[245]. Special Features:Attracts birds, Attractive foliage, North American native, Inconspicuous flowers or blooms.

4.2.139 Picea engelmannii

Mountain Spruce, Engelmann spruce
3 tlin 7 cyuc 2 kcaak 0 tcan 2 dwat 20 m hkuc
htut cyutli tcuphja7n hwicli hyishrasjltutnyik hpa7tli frusflat-
prik hpa7tmwatli hjonli

drutta *Picea engelmannii* is an evergreen Tree growing to 20 m (65ft) by 6 m (19ft) at a medium rate. See above for USDA hardness. It is hardy to UK zone 3 and is not frost tender. It is in leaf all year, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It cannot grow in the shade. It prefers moist or wet soil. The plant can tolerate strong winds but not maritime exposure. It cannot tolerate atmospheric pollution.

kcakta Edible Parts: Flowers Inner bark Seed Edible
Uses: Tea/Young male catkins - raw or cooked. Used as a flavouring[172]. Immature female cones - cooked. The central portion, when roasted, is sweet and syrupy[172]. The cones are about 5cm long[82]. Inner bark - dried, ground into a powder and then used as a thickener in soups etc or added to cereals when making bread[172]. An emergency food when all else fails. Seed - raw[172]. The seed is about 2 - 4mm long[229] and is too small and fiddly to be worthwhile unless you are desperate[172]. A refreshing tea, rich in vitamin C, can be made from the young shoot tips[172].

tcanta Basketry Charcoal Fibre Fuel Tannin WoodThe bark is a source of tannin[46, 61, 82]. The branches and the roots have been shredded, pounded and used to make cord and rope[257]. (It is probably the bark that was used[K].) The bark has been used to make baskets and various small utensils[257]. Wood - close-grained, light, soft, not strong. It is used for lumber, construction, fuel and charcoal[46, 61, 82, 171]. It is also valued for its use in the pulp industry to make paper[171].

dwatta Cancer Eczema Pectoral Salve Skin TB Vitamin CAn infusion of the bark has been used in the treatment of respiratory complaints, TB etc[257]. A decoction of the leaves and gum has been used in the treatment of cancer[257]. It was said that if this treatment did not work then nothing would work[257]. The decoction was also used in the treatment of coughs[257]. The ashes of the twigs, mixed with oil, have been used as an ointment or salve on damaged skin[257]. The pitch obtained from the trunk has been used in the treatment of eczema[257].

nrakta Western N. America - Alberta and British Columbia to Arizona and New Mexico. ksacta Montane regions to the tree-line, especially by swamps[60]. Often found on poor thin rocky soils, though the best specimens are growing in deep well-drained clay-loam soils[229].

propta Seed - stratification will probably improve germination so sow fresh seed in the autumn in a cold frame if possible[80]. Sow stored seed as early in the year as possible in a cold frame[78]. A position in light shade is probably best[78]. Seed should not be allowed to dry out and should be stored in a cool place[80]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the greenhouse or cold frame for their first winter. They can be planted out into their permanent positions in early summer of the following year, or be placed in an outdoor nursery bed for a year or so to increase in size. They might need protection from spring frosts. Cuttings of semi-ripe terminal shoots, 5 - 8cm long, August in a frame. Protect from frost. Forms roots in the spring[78]. Cuttings of mature terminal shoots, 5 - 10cm long, September/October in a cold frame. Takes 12 months[78]. Cuttings of soft to semi-ripe wood, early summer in a frame. Slow but sure.

nwatta Likes abundant moisture at the roots, if grown in drier areas it must be given a deep moist soil[11]. Tolerates poor peaty soils[200]. Succeeds in wet cold and shallow soils but is not very wind-firm in shallow soils[1]. Prefers a pH between 4 to 6[200]. Dislikes shade[200]. Intolerant of atmospheric pollution[11]. Resists wind exposure to some degree[200]. Plants have a shallow root system and are easily wind-blown[155]. Often planted for its timber in N. Europe[50]. Trees are of moderate growth after a slow start, older trees often averaging over 40cm a year[185]. Trees grow better and faster in the north of Britain than in

the south. This is not an easy tree to grow in Britain[11], it prefers a continental climate and, although the dormant tree is very cold hardy, the new growth in spring is very susceptible to damage by late frosts in this country[11]. Quite long-lived in its native range, with specimens 500 - 600 years old[229]. Seed production commences around the age of 20 - 25 years, with excellent crops every 2 - 6 years[229]. Closely related to *P. glauca*, this species also hybridizes with *P. sitchensis* in the south of its range[226]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. In some upland areas, especially over granitic or other base-poor soils, growth rate and health have been seriously affected by aluminium poisoning induced by acid rain[200]. The crushed foliage is often said to be foetid but after the first sniff the scent is sweet and like menthol or camphor[185]. Plants are susceptible to damage by the green spruce aphid[1].

4.2.140 Ulmus rubra

Slippery Elm

3 tlin 7 cyuc 2 kcaak 3 tcan 5 dwat 20 m hkuc
hmimhtut cyutli tcup hwicli hrasjltutnyik hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta *Ulmus rubra* is a deciduous Tree growing to 20 m (65ft) by 15 m (49ft) at a medium rate. See above for USDA hardness. It is hardy to UK zone 3 and is not frost tender. It is in flower from March to May, and the seeds ripen from May to June. 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 Outer bark constituents known to cause abortions - avoid during pregnancy [301].

kcakta Edible Parts: Fruit Inner bark Leaves Edible
Uses: Tea/Leaves - raw or cooked. Inner bark - raw or cooked. It can be dried, ground into a powder and then used as a thickener in soups or added to cereal flours when making bread etc[2, 14, 46, 55, 171]. It can also be chewed as a thirst quencher[227]. The inner bark has been cooked with fats in order to prevent them becoming rancid[257]. Immature fruit - raw or cooked[177]. The fruit is about 20mm in diameter[200]. A tea-like beverage can be brewed from the inner bark[257].

tcanta Fibre Kindling Roofing Tinder WoodA fibre obtained from the inner bark is used to make a twine[189, 257]. The boiled bark has been used for making matting, nets etc[257]. The inner bark has been used in making baskets[257]. The bark has been used as a roofing material[257]. The weathered bark has been used as kindling for starting a fire[257]. Wood - very close-grained, tough, heavy, hard, strong, durable, easy to split. It weighs 43lb per cubic foot and is used for fence posts, window sills, agricultural implements etc[46, 61, 82, 227].

dwatta Demulcent Diuretic Emollient Expectorant Nutritive Urinary Slippery elm bark is a widely used herbal remedy and is considered to be one of the most valuable of remedies in herbal practice[4]. In particular, it is a gentle and effective remedy for irritated states of the mucous membranes of the chest, urinary tubules, stomach and intestines[254]. The inner bark contains large quantities of a sticky slime that can be dried to a powder or made into a liquid[229]. The inner bark is harvested in the spring from the main trunk and from larger branches, it is then dried and powdered for use as required[4]. Ten year old bark is said to be best[4]. Fine grades of the powder are best for internal use, coarse grades are better suited to poultices[238]. The plant is also part of a North American formula called *essiac* which is a popular treatment for cancer. Its effectiveness has never been reliably proven or disproven since controlled studies have not been carried out. The other herbs included in the formula are *Arctium lappa*, *Rumex acetosella* and *Rheum palmatum*[254]. The inner bark is demulcent, diuretic, emollient, expectorant, nutritive[4, 21, 165, 213]. It has a soothing and

healing effect on all parts of the body that it comes into contact with[4] and is used in the treatment of sore throats, indigestion, digestive irritation, stomach ulcers etc[222]. It used to be frequently used as a food that was a nutritive tonic for the old, young and convalescents[222]. It was also applied externally to fresh wounds, burns and scalds[222]. The bark has been used as an antioxidant to prevent fats going rancid[222]. The whole bark, including the outer bark, has been used as a mechanical irritant to abort foetuses[238]. Its use became so widespread that it is now banned in several countries[238].

nrakta Central and Southern N. America - Maine to Florida, west to Texas and North Dakota. ksacta Rich deep soils, often calcareous, on the banks of streams and low rocky hillsides[43, 82].

propta Seed - if sown in a cold frame as soon as it is ripe, it usually germinates within a few days[200]. Stored seed does not germinate so well and should be sown in early spring[200], it requires 2 - 3 months stratification according to another report[113]. The seed can also be harvested 'green' (when it has fully developed but before it dries on the tree) and sown immediately in a cold frame. It should germinate very quickly and will produce a larger plant by the end of the growing season[80]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Plants should not be allowed to grow for more than two years in a nursery bed since they form a tap root and will then move badly. Layering of suckers or coppiced shoots[200].

nwatta Industrial Crop: Medicinal Management: Cop-pice Management: Standard Minor Global CropPrefers a fertile soil in full sun[188], but can be grown in any soil of at least moderate quality so long as it is well drained[1]. Plants are hardy to about -10°C[238]. A moderately fast-growing tree, living about 200 years in the wild[229], but although perfectly hardy, this species does not usually thrive in Britain[11]. Trees are often harvested in the wild for their edible inner bark, the 'slippery elm' that can be obtained from chemists and health food shops[K]. Trees have been over-exploited in the wild, plus they have also suffered from Dutch elm disease. As a result they are becoming much less common[238]. The slippery elm is very susceptible to 'Dutch elm disease', a disease that has destroyed the greater part of all the elm trees growing in Britain. The disease is spread by means of beetles. There is no effective cure (1992) for the problem, but most E. Asian, though not Himalayan, species are resistant (though not immune) to the disease so the potential exists to use these resistant species to develop new resistant hybrids with the native species[200]. The various species of this genus hybridize freely with each other and pollen is easily saved, so even those species with different flowering times can be hybridized[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

4.2.141 *Pinus strobus*

White Pine, Eastern white pine

3 tlin 7 cyuc 2 kcaok 0 tcan 3 dwat 20 m hkuo
htut cyuti hgatkyuctop hwlici hyishrasjlut hpa7tli flatprik
hpa7tmwatli dyat hjonli

drutta *Pinus strobus* is an evergreen Tree growing to 20 m (65ft) by 5 m (16ft) at a fast rate.It is in leaf all year, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. It cannot tolerate atmospheric pollution.

pcista The wood, sawdust and resins from various species of pine can cause dermatitis in sensitive people[222]. Avoid if allergies. Avoid internally if suffering from asthma

or bronchitis. The astringent taste may cause stomach dis-comfort [301].

kcakta Edible Parts: Flowers Inner bark SeedEdible Uses: Condiment Drink Gum TeaSeed - raw or cooked[102, 159]. Rather small and fiddly, it is only about 6mm long[200]. The seed is mainly used as a flavouring in cooking[213]. The fresh needles are brewed into an aromatic tea that is rich in vitamins A and C[183]. A refreshing drink is made from the leaves[159]. An acceptable candy is made by boiling the tender new shoots in syrup[183]. The sticky amber sap can be used for chewing[102, 159]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200]. The firm unexpanded male cones can be boiled and used as a flavouring[177, 183]. A pleasant sweet flavour[257]. Inner bark - raw or cooked. A sweet flavour[105, 159, 161, 213]. There are no more details but inner bark is often dried, ground into a powder and then used as a thickener in soups etc or added to cereals when making bread.

tcanta Dye Gum Herbicide Miscellany Pitch Waterproofing WoodA tan or green dye is obtained from the needles[168]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing canoes, containers etc, as a wood preservative etc[257]. Wood - straight and close-grained, light, soft, not strong, works easily and takes an excellent natural or painted finish[46, 61, 82, 171, 226, 229]. It weighs 24lb per cubic foot[235]. A very valuable timber[235], the wood is especially suited for making the masts of ships[4] and is also used for lumber, cheap furniture, house interiors, construction etc[46, 61, 82, 171, 226, 229].

dwatta Antiscorbatic Demulcent Diuretic Expectorant Miscellany Pectoral Poultice Salve Vitamin CWhite pine was employed medicinally by several native North American Indian tribes who valued it especially for its antiseptic and vulnerary qualities, using it extensively in the treatment of skin complaints, wounds, burns, boils etc[257]. It is also very beneficial to the respiratory system and so was used in treating coughs, colds, influenza and so on[257]. 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]. A poultice of pitch has been used to draw out toxins from boils and reduce the pain[257]. The dried inner bark is demulcent, diuretic and expectorant[4]. An infusion was used as a treatment for colds[213] and it is still used as an ingredient in commercial cough syrups, where it serves to promote the expulsion of phlegm[213]. A poultice made from the pounded inner bark is used to treat cuts, sores and wounds[213]. The wetted inner bark can be used as a poultice on the chest in treating strong colds[257]. The dried inner bark contains 10% tannin, some mucilage, an oleoresin, a glycoside and a volatile oil[213]. A tea made from the young needles is used to treat sore throats[213]. It is a good source of vitamin C and so is effective against scurvy[213]. An infusion of the young twigs has been used in the treatment of kidney disorders and pulmonary complaints[257]. The powdered wood has been used as a dressing on babies chafed skin, sores and improperly healed navels[257].

nrakta Eastern N. America - Newfoundland to Manitoba,

south to Georgia. ksacta Woods, especially on sandy drift soils or fertile well-drained soils, sometimes on river banks and rarely in swamps[82]. Often forming dense forests[235].

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: Christmas tree, Aggressive surface roots possible, Screen, Superior hedge, Specimen. Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. Intolerant of atmospheric pollution[188]. The white pine is a very important timber crop in its native range, the huge stands that existed before the Europeans went to N. America have been largely cut down[229]. It is a fast-growing and fairly long-lived tree[229] that is often cultivated as a timber tree, especially in central Europe[50]. Young trees grow very vigorously with new shoots of up to 1 metre common. Growth slows and almost ceases by the time the tree is 20 metres tall[185]. Trees can produce cones when 5 - 10 years old, but reliable seed production takes another 10 years[229]. Good crops are produced every 3 - 5 years in the wild, with little seed in the intervening years[229]. The cones are 10 - 20cm long and take 2 years to mature[82, 229], they open and shed their seed in late summer whilst still attached to the tree[82, 226]. Plants often self-sow in Britain[185]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. Trees have a very thin bark, which makes them particularly susceptible to forest fires[226]. This species is very susceptible to white pine blister rust, it should not be grown near any gooseberries or currants (*Ribes* species) since these plants can act as vectors for the disease[1, 120]. Plants are also subject to aphid damage[1]. Plants in this genus are notably susceptible to honey fungus[200]. Leaf secretions inhibit the germination of seeds, thereby reducing the amount of plants that can grow under the trees[18]. Special Features: Attracts birds, Attractive foliage, North American native, Fragrant foliage, Naturalizing, Inconspicuous flowers or blooms.

4.2.142 *Juniperus virginiana*

Pencil Cedar, Eastern redcedar, Southern redcedar, Silver Cedar, Burk Eastern Red Cedar, Silver East
3 tlin 9 cyuc 2 kcaak 4 tcan 2 dwat 20 m hkuc
htut cyutli hgatkuyctucp hwicli hraslutnyik hpa7tli flatprikli-wisslip hpa7tmwotli nyanhjen hjonli

drutta *Juniperus virginiana* is an evergreen Tree growing to 20 m (65ft) by 8 m (26ft) at a slow rate. See above for USDA hardness. It is hardy to UK zone 4. It is in leaf all year, in flower from April to May, and the seeds ripen in October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required), and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils 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 All parts of the plant might be toxic[4, 222].
ckakta Edible Parts: Fruit Edible Uses: Tea Fruit - raw or cooked[106]. A sweetish resinous flesh[82]. They can be

crushed and used as a flavouring in soups and stews[257]. The cones are about 5mm in diameter[200]. About 10mm according to another report[226]. A tea is made from the fruit[159]. It is not very nice[159]. It is made from the young branchlets and the fruit according to one report[183].

tcanta Essential Insecticide Repellent Shelterbelt Tinder Wood An essential oil is obtained from the wood[1, 46, 57, 61]. Composed of cedar camphor or cedrol[213], it is used in soaps, as an insecticide and moth repellent[61, 213], a deodorant, in polishes, perfumery etc[4, 21]. Chips of the wood have been used as moth repellents[269]. The leaves are used as an incense[46, 213] and are also either burnt or crushed and then scattered around as an insect repellent[169, 257]. The crushed bark can be used as a soft base in cradles[257]. The bark has also been cut into strips and used to make mats[257, 269]. The red inner bark is a source of a red dye[269]. The bark of the tree is useful as tinder in starting fires Boy Scout style[269]. Some cultivars of this tree are suitable for ground cover when spaced about 90cm apart each way[208]. 'Tripartita' and 'Chamberlaynii' have been recommended[208]. A fairly wind resistant tree, it can be grown as part of a shelterbelt planting[200]. Wood - very durable, light, brittle, soft, easily worked, very fragrant, insect-resistant[1, 46, 82, 171, 227]. The wood does not shrink much on drying and weighs 30lb per cubic foot[227]. The reddish wood is highly prized for cabinet making[226], it is also used for fencing, the casing of lead pencils etc[1, 46, 82, 171].

dwatta Abortifacient Anthelmintic Antiseptic Aromatherapy Cancer Diaphoretic Diuretic Emmenagogue Rubefacient Stimulant Phorecitic cedar leaves were much used medicinally by the native N. American Indians, and also in folk medicine by the white settlers, especially to treat chest complaints and skin problems such as venereal warts and other excrescences[269]. The leaves are anthelmintic, diuretic, rubefacient and stimulant[4, 257]. A decoction has been used in the treatment of coughs and colds, general weakness and as a medicine for convalescents[257]. The berries are anthelmintic, diaphoretic, emmenagogue and mildly antiseptic[4, 213, 222, 257]. They have been chewed as a treatment for mouth ulcers[213, 257] or made into a tea to treat colds, rheumatism, worms etc[222, 257]. The fresh young twigs are used as a diuretic[213]. An infusion has been used both internally and as a steam bath in the treatment of rheumatism[257]. The essential oil from the wood is an abortifacient, in some cases it has caused vomiting, convulsions, coma and death[4, 213]. The plant is said to contain the anticancer compound podophyllotoxin[222]. The essential oil from the berries is used in aromatherapy. Its keyword is 'Composing'[210].

nrakta Central and Eastern N. America from Canada south to Georgia and Texas. ksacta Dry, rarely wet, open woods and rock slopes, often on limestone[43]. Infertile soils and old pastures[222].

propta The seed requires a period of cold stratification. The seed has a hard seedcoat and can be very slow to germinate, requiring a cold period followed by a warm period and then another cold spell, each of 2 - 3 months duration[78, 81]. Soaking the seed for 3 - 6 seconds in boiling water may speed up the germination process[11]. The seed is best sown as soon as it is ripe in a cold frame. Some might germinate in the following spring, though most will take another year. Another possibility is to harvest the seed 'green' (when the embryo has fully formed but before the seedcoat has hardened). The seedlings can be potted up into individual pots when they are large enough to handle. Grow on in pots until large enough, then plant out in early summer. When stored dry, the seed can remain viable for several years[1]. Cuttings of mature wood, 5 - 10cm with a heel, September/October in a cold frame. Plant out in the following autumn[1, 78]. Layering in September/October. Takes 12 months[78].

nwatta Landscape Uses: Christmas tree, Firewood, Screen, Seashore, Specimen, Street tree. Succeeds in most soils if they are well drained, preferring a neutral or slightly alkaline soil[1, 11] and succeeding on chalk[200]. Established plants are drought tolerant, succeeding in hot dry positions[200]. They are also fairly wind-resistant[200]. A very ornamental and hardy plant[1]. It is very slow growing[4] and apparently short-lived in Britain[185], though it is very long-lived in its native environment[226]. Another report says that plants live to a moderate age of 200 - 350 years in the wild[229]. Cultivated as a timber tree in some parts of

C. and S. Europe[50] and used as a Christmas tree in parts of N. America[269], there are some named forms, selected for their ornamental value[200]. Closely related to *J. scopulorum*, it hybridizes with that species where their ranges overlap[226]. The main difference between the two species is that the fruits of this plant mature in one year whilst those of *J. scopulorum* take two years[226]. This species often hybridizes with other members of the genus. The crushed foliage has an aroma like soap or paint[185]. Plants are resistant to honey fungus[88]. In America this tree is a host of a gall-like rust that at certain stages in its life-cycle also attacks the leaves of apple trees[149]. Plants are usually dioecious, though trees with both male and female flowers are occasionally found[229]. Male and female plants must usually be grown if seed is required. Special Features: Attracts birds, North American native, Fragrant foliage, Attracts butterflies, Attractive flowers or blooms. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is flat with shallow roots spreading near the soil surface [2-1].

4.2.143 *Betula platyphylla*

White Birch, Asian white birch,
3 tlin 6 cyuc 2 kcaak 3 tcan 2 dwat 20 m hkuc
htut cyutli kyuctcup hwicli hyishrasjlutnyikfrp hpa7tli flat-prikrlwis hpa7tmwatli hjonli

drutta *Betula platyphylla* is a deciduous Tree growing to 20 m (65ft 7in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from April to May, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. 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: Inner bark SapEdible Uses: Inner bark - cooked. Rich in starch[177]. It can be dried and ground into a meal and used as a thickener in soups etc or 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[K]. Sap. Used for making a vinegar[177].

tcanta Dynamic accumulator.

dwatta Antifungal Antiinflammatory Antiseborrheic Cancer Tonic UrinaryThe bark of the sub-species *Betula platyphylla japonica* is often used medicinally in Korea. It contains several medically active constituents including triterpenoids and flavonoids and is antifungal, anti-inflammatory and tonic[279]. It is used in the treatment of conditions such as internal diseases and inflammation[279]. The root bark, and other parts of the plant, show anticancer activity[218]. 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 E. Asia - northern China, Japan, Korea, Siberia. ksakta Highlands, C. and N. Japan[58].

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:Specimen. Succeeds in a well-drained loamy soil in a sunny position[11, 200]. Tolerates most soils including poor soils and heavy clays[200]. Fairly wind tolerant[200]. A fast-growing but short-lived tree[200]. Hybridizes freely with other members of this genus[50]. This species is closely related to *B. pendula*[11]. A good plant to grow near the compost heap, aiding the fermentation process[20]. Trees are notably susceptible to honey fungus[200]. Special Features: Not North American native, Inconspicuous flowers or blooms.

4.2.144 *Plantago major*

Common Plantain, Cart Track Plant,White Man's Foot ,Plantain
3 tlin 12 cyuc 2 kcaak 3 tcan 3 dwat m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikrlwis hpa7tmwatli fyifxre7t hjonli

drutta *Plantago major* is a PERENNIAL growing to 0.1 m (0ft 4in) by 0.1 m (0ft 4in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to September, and the seeds ripen from July to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate maritime exposure.

pcista High doses may cause a fall in blood pressure and diarrhoea. Possible allergic contact dermatitis. Avoid in patients with intestinal obstruction or abdominal discomfort [301].

kcaakta Edible Parts: Leaves Root SeedEdible Uses: TeaYoung leaves - raw or cooked[2, 5, 12, 56, 62, 183]. They are rather bitter and tedious to prepare because the fibrous strands need to be removed before use[9]. It is best not to use the leaf-stalk since this is even more fibrous than the leaf[183]. Many people blanch the leaves in boiling water before using them in salads in order to make them more tender[183]. A Chinese form has more palatable leaves - it contains about 2.7% protein, 0.4% fat, 2.2% ash[179]. Seed - raw or cooked[62, 172]. Very tedious to harvest[172]. The seed can be ground into a meal and mixed with flour[183]. It is very rich in vitamin B1[179]. The whole seeds can be boiled and used like sago[193]. The dried leaves make an acceptable tea[183]. Root[183]. No further details.

tcanta Some named forms have been selected for their ornamental value[233]. An important food plant for the caterpillars of many species of butterflies[30]. Special Features: Edible, Naturalizing, Suitable for dried flowers. Dynamic accumulator.

dwatta Antidote Astringent Demulcent Deobstruent Depurative Diuretic Expectorant Haemostatic Laxative Ophthalmic Poultice Refrigerant VermifugeCommon plantain is a safe and effective treatment for bleeding, it quickly staunches blood flow and encourages the repair of damaged tissue[254]. The leaves are astringent, demulcent, deobstruent, depurative, diuretic, expectorant, haemostatic and refrigerant[4, 7, 9, 21, 147, 165, 172, 238]. Internally, they are used in the treatment of a wide range of complaints including diarrhoea, gastritis, peptic ulcers, irritable bowel syndrome, haemorrhage, haemorrhoids, cystitis, bronchitis, catarrh, sinusitis, asthma and hay fever[238, 254]. They are used externally in treating skin inflammations, malignant ulcers, cuts, stings etc[4]. The heated leaves are used as a wet dressing for wounds, swellings etc[213, 222]. The root is a remedy for the bite of rattlesnakes, it is used in equal portions with *Marrubium vulgare*[207]. The seeds are used in the treatment of parasitic worms[213]. Plantain seeds contain up to 30% mucilage which swells up in the gut, acting as a bulk laxative and soothing irritated membranes[238]. Sometimes the seed husks are used without the seeds[238]. A distilled water made from the plant makes an excellent eye lotion[7].

nrakta Most of Europe, including Britain, to northern and central Asia. ksakta A common garden weed, particularly in lawns[1, 4, 13]. Rarely in grassy places[17].

propta Seed - sow spring in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in early summer. A sowing can be made outdoors in situ in mid to late spring if you have enough seeds.

nwatta Succeeds in any moderately fertile soil in a sunny position[200]. Although this species is a common garden weed, some named forms have been selected for their ornamental value[233].

4.2.145 Sambucus mexicana

Mexican Elder

3 tlin 9 cyuc 2 kcaok 0 tcan 1 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikliwis
hpa7tmwatli xre7t hjonli

drutta *Sambucus mexicana* is a deciduous Shrub growing to 1 m (3ft 3in). It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

pcista Although no specific mention has been seen for this species, the leaves and stems of some, if not all, members of this genus are poisonous[9, 76]. The fruit of many species (although no records have been seen for this species) has been known to cause stomach upsets to some people. Any toxin the fruit might contain is liable to be of very low toxicity and is destroyed when the fruit is cooked[65, 76].

kcakta Edible Parts: Flowers Fruit Edible Uses: Flowers - raw or cooked[183]. Fruit - raw or cooked[257]. It is usually dried before being used since this reduces a somewhat rank taste[177, 181, 183]. The fruit can be used in making pies, preserves, winemaking etc[183]. The fruit is about 6mm in diameter and is borne in large clusters[227]. Some caution is advised, see the notes above on toxicity.

tcanta Dye Wood A purple to black dye is obtained from the fruits[257]. An orange to yellow dye is obtained from the stems[257]. Wood - soft and coarse-grained[227].

dwatta Febrifuge Laxative Stomachic An infusion of the blossoms has been used in the treatment of upset stomachs, fevers, sore throats, colds and flu[257]. A decoction of the roots has been used in the treatment of constipation[257].

nrakta South-western N. America - California to New Mexico, south to Mexico. ksacta Open flats and cismontane valleys and canyons below 1850 metres in California[71]. Oak forests along streams and ditches, 1800 - 3000 metres in Mexico[181].

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

nwatta We have very little information on this species and do not know if it will be hardy in Britain, though judging by its native range it should succeed outdoors in many parts of this country. It is closely related to *S. caerulea*[71]. The following notes are based on the general needs of the genus. Tolerates most soils, including chalk[200], but prefers a moist loamy soil[11, 200]. Grows well in heavy clay soils. Tolerates some shade but is best in a sunny position[1]. Tolerates atmospheric pollution and coastal situations[200]. Plants in this genus are notably resistant to honey fungus[200].

4.2.146 Acer mono

Maple

3 tlin 8 cyuc 2 kcaok 0 tcan 1 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasljutnyikfrip hpa7tli flatprikliwis
hpa7tmwatli hjonli

drutta *Acer mono* is a deciduous Tree growing to 15 m (49ft 3in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 6. It is in flower from April to May, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Leaves Sap Edible Uses: The sap contains a certain amount of sugar and can either be used as a drink, or can be concentrated into a syrup by boiling off the water[105, 177]. The syrup is used as a sweetener on many foods. The concentration of sugar is considerably lower than in the sugar maples (*A. saccharum*). The tree trunk is tapped in the early spring, the sap flowing better on warm sunny days following a frost. The best sap production comes from cold-winter areas with continental climates. Leaves - cooked. A famine food, they are only used when all else fails[179].

tcanta Fuel Preservative Wood The leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. Wood - hard, close grained[46]. Used as a fuel[46].

dwatta Astringent Irritant The leaves are an irritant[240]. The bark is astringent[240].

nrakta E. Asia - China, Japan, Korea, Mongolia and eastern Russia ksacta Mountains all over Japan[58]. Hillsides, mountain valleys and forests from sea level to 1800 metres in China[266].

propta Seed of this species is rarely available. If obtained, it is best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter. Grafting onto the roots of *A. platanoides* is usually successful, but the graft should be made as low as possible to reduce the incident of suckers from the rootstock.

nwatta Landscape Uses: Specimen. Of easy cultivation, it prefers a good moist well-drained soil[11] and a position that is at least moderately sunny[11, 200]. Grows well in heavy clay soils. Chlorosis can sometimes develop as a result of iron deficiency when the plants are grown in alkaline soils, but in general maples are not fussy as to soil pH. A polymorphic species[58], it is closely related to *A. truncatum*[11]. Most maples are bad companion plants, inhibiting the growth of nearby plants[18, 20]. Special Features: Not North American native, Inconspicuous flowers or blooms.

4.2.147 Calochortus macrocarpus

Sagebrush Mariposa Lily, Nez Perce mariposa lily

3 tlin 7 cyuc 2 kcaok 0 tcan 1 dwat m hkuc
htut cyutli kyuctcup hwicli hrasljut hpa7tli flatprikliwis
hpa7tmwatli xre7t hjonli

drutta *Calochortus macrocarpus* is a BULB growing to 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium

(sandy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Flowers RootEdible Uses: Bulb - raw or cooked[105, 161, 177, 257]. The bulb can be harvested in early spring, peeled and eaten raw[257]. It can also be boiled or baked and used like potatoes[257]. Flower buds - raw[257]. A sweet flavour[257].

dwatta SkinA poultice of the mashed bulbs has been used to treat poison ivy rash[257].

nrakta Western N. America - British Columbia to Nevada. ksakta Dry hills, usually in loose soil[60]. In sagebrush scrub and open coniferous forests to 2000 metres[90].

propta Seed - sow as soon as ripe or early spring in a cold frame in a very sharply draining medium. Stratification may be helpful. Germination usually takes place within 1 - 6 months at 15°C[138]. Leave the seedlings undisturbed for their first two years growth[138], but give them an occasional liquid feed to ensure they do not become nutrient deficient. It is quite difficult to get the seedlings through their first period of dormancy since it is all too easy either to dry them out completely or keep them too moist when they will rot[214]. After their second year of growth, pot up the dormant bulbs in late summer and grow them on for at least another 2 years in the greenhouse before trying them outside. Seedlings take about 5 - 7 years to come into flower[214]. Division of the bulbs as soon as the foliage dies down. One report says that the bulbs must be planted into their permanent positions immediately[1], whilst another says that they can be stored overwinter and replanted in the spring[138]. Stem bulbils, harvested from the stems after flowering[200]. They can be stored cool and dry then planted in pots in the cold frame in the spring.

nwatta Requires a deep very well-drained fertile sandy soil in a sunny position and must be kept dry over winter[1, 200]. This is a rather difficult plant to cultivate in Britain, it is very cold hardy but is intolerant of wetness especially in the winter. It is easiest to grow in a bulb frame but is worth trying outdoors at the base of a south-facing wall, especially with shrubs that like these conditions[120]. Bulbs can be lifted as soon as the foliage dies down in the summer and stored overwinter in a cool dry place, replanting in spring[138]. Bulbs frequently divide after flowering, the bulblets taking 2 years to reach flowering size[200]. Hand pollination is necessary if seed is required[1].

4.2.148 Aster macrophyllus

Bigleaf Aster

3 tlin 7 cyuc 2 kcaak 2 tcan 1 dwat m hkuc
hmimhtut cyutli kyucput hwicli hrasjlutnyik hpa7tli flatprikhlwis hpa7tmwatli fyfjre7t hjonli

drutta Aster macrophyllus is a PERENNIAL growing to 0.6 m (2ft) by 0.6 m (2ft in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Leaves RootEdible Uses: Very young leaves - cooked and used as a vegetable[46, 61, 105, 161, 177]. The leaves are said to act as a medicine as well as a food, though no details are given[257]. Only young leaves are eaten as old leaves quickly become tough[213]. Roots - cooked. They have been used in soups[257].

tcanta Plants can be used as a ground cover in light shade, forming a spreading clump[208, 233].

dwatta Blood purifier Laxative VDTThe roots have been used as a blood medicine[257]. An infusion of the root has been used to bathe the head to treat headaches[257]. A compound decoction of the roots has been used as a laxative in the treatment of venereal disease[257].

nrakta Eastern N. America. Occasionally naturalized in Britain[17]. ksakta Dry to moist open woods, thickets and clearings[43]. By rivers and streams in Britain[17].

propta Seed - surface sow in spring in a cold frame. Do not allow the compost to become dry. Pre-chilling the seed

for two weeks can improve germination rates[134]. Germination usually takes place within 2 weeks at 20°C[134]. When large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. Division in spring or autumn[200]. Very easy, larger divisions can be planted straight into their permanent positions whilst smaller clumps are best potted up and kept in a cold frame until they are growing away well. Basal cuttings in late spring. Harvest the shoots when they are about 10 - 15cm long with plenty of underground stem. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer.

nwatta Succeeds in most good garden soils[1], preferring one that is well-drained and moisture retentive[200]. Prefers a sunny position[200]. Succeeds in dry soils in the shade[200]. Grows well in light woodland shade[88], succeeding amongst the roots of other plants[233]. Plants are hardy to about -25°C[187]. The plant has an invasive root system and can spread freely when well sited[233]. Slugs are fond of this plant and have destroyed even quite large clumps by eating out all the new growth in spring[K]. Most species in this genus seem to be immune to the predations of rabbits[233]. A very variable plant with many different forms[187], it hybridizes freely with other members of this genus[200].

4.2.149 Potentilla multifida

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat m hkuc
hmimhtut cyutli tkcup hwicli hrasjlutnyik hpa7tli flatprikhlwis hpa7tmwatli fyfjre7t hjonli

drutta Potentilla multifida is a PERENNIAL growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: RootEdible Uses: Root - cooked[61]. Starchy[105, 177].

nrakta Europe to E. Asia. ksakta Mountainous regions in Europe[50]. Alpine valleys, meadows on mountain slopes, sandy riverbanks, ravines and forest edges at elevations of 700 - 5000 metres in northern China[266].

propta Seed - sow early spring or autumn in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Division in spring. 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 Easily grown in a well-drained loam, preferring a position in full sun but tolerating shade[1]. Prefers an alkaline soil but tolerates a slightly acid soil[200]. Members of this genus are rarely if ever troubled by browsing deer[233].

4.2.150 Pseudotsuga menziesii

Douglas Fir, Rocky Mountain Douglas-fir

3 tlin 6 cyuc 2 kcaak 0 tcan 2 dwat m hkuc
htut cyutli tcuphja7n hwicli hrasjlutnyik hpa7tli flatprikhlwis hpa7tmwatli hjonli

drutta Pseudotsuga menziesii is an evergreen Tree growing to 75 m (246ft) by 20 m (65ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 7 and is not frost tender. It is in leaf all year, in flower from March to May, and the seeds ripen from September 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 Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers moist or

Marret soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Inner bark **NonEdible Uses:** Coffee Condiment Gum TeaYoung shoot tips - used as a flavouring in cooked foods[15, 177]. A subtle woody flavour[183]. A refreshing tea is made from the young leaves and twigs[14, 46, 177, 257]. Rich in vitamin C[183]. It is used as a coffee substitute according to some reports[92, 95, 161, 257]. The fresh leaves have a pleasant balsamic odour and are used as a coffee substitute[213]. Inner bark - dried, ground into a meal and mixed with cereals for making bread etc[161, 213]. A famine food used when all else fails[177]. A sweet mannalike substance is exuded from the bark[177, 183]. This report possibly refers to the resin that is obtained from the trunk[K], and is used as a chewing gum by various native North American Indian tribes[226]. Alternatively, the report could be referring to the sap which is used as a sugar-like food[257].

tcanta Basketry Cork Dye Fertilizer Fuel Gum Insecticide Resin Shelterbelt Tannin WoodA light brown dye is obtained from the bark[118, 257]. The bark is a source of tannins[46, 82]. The bark can be used as a cork substitute[171] and is also used to make fertilizer[226]. The bark contains pitch, it burns with a lot of heat and almost no smoke, so it is prized as a fuel[226, 257]. The small roots have been used to make baskets[257]. The plant has insecticidal properties[171]. A resin is obtained from the trunk, similar to *Abies balsamea*[61, 64] which is used in the manufacture of glues, candles, as a cement for microscopes and slides and also as a fixative in soaps and perfumery[171]. The resin can also be used as a caulking material on boats[257]. A fast growing and fairly wind-resistant tree, it is often used in shelterbelt plantings[185]. Wood - heavy, strong, fine grained, durable, though it can be of variable quality. It dries quickly, does not warp and is easily worked, it is used for heavy construction, telegraph poles, furniture etc[21, 46, 61, 82, 99, 171, 200, 226]. It is also used as a good quality fuel[46, 99, 257].

dwatta Antirheumatic Antiseptic Kidney Mouthwash Poultice Skin Vitamin CDouglas fir was often employed medicinally by various native North American Indian tribes who used it to treat a variety of complaints[257]. It is little, if at all, used in modern herbalism. An antiseptic resin is obtained from the trunk. It is used as a poultice to treat cuts, burns, wounds and other skin ailments[226, 257]. The poultice is also used to treat injured or dislocated bones[257]. The resin is used in the treatment of coughs and can be chewed as a treatment for sore throats[257]. An infusion of the green bark has been used in the treatment of excessive menstruation, bleeding bowels and stomach problems[257]. An infusion of the leaves has been used as a wash and a sweat bath for rheumatic and paralyzed joints[257]. An infusion of the young sprouts has been used in the treatment of colds[257]. An infusion of the twigs or shoots has been used in the treatment of kidney and bladder problems[257]. A decoction of the buds has been used in the treatment of venereal disease[257]. Young shoots have been placed in the tips of shoes to keep the feet from perspiring and to prevent athletes foot[257]. A mouthwash is made by soaking the shoots in cold water[15].

nrakta Western N. America - Canada to California. Occasionally self-sows in Britain[17]. **ksacta Moist** to very dry areas from sea level to near the tree-line in the Rocky mountains[60]. The best specimens are found on well-drained deep loamy soils with plenty of moisture[229].

propta Seed - best sown in the autumn to winter in a cold frame so that it is stratified[80]. The seed can also be stored dry and sown in late winter. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the cold frame for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Seedlings tolerate light shade for their first few years of growth. Cones often fall from the tree with their seed still inside[80]. If you have plenty of seed then it can be sown in an outdoor seedbed in early spring[80]. Grow the plants on for at least two years in the seedbed before planting them out in late autumn or early spring.

nwatta Landscape Uses: Christmas tree, Firewood, Aggressive surface roots possible, Screen, Specimen. Prefers a moist but not water-logged alluvial soil[1]. Dislikes calcareous soils[1]. Trees are a failure on dry hungry soils.[11]. Whilst they are moderately wind resistant[166], tall speci-

mens are likely to lose their crowns once they are more than 30 metres tall in all but the most sheltered areas[185]. A very ornamental tree[1], it is the most cultivated timber tree in the world and is extensively used for re-afforestation in Britain[200]. There are several named varieties selected for their ornamental value[188]. Trees can be established in light shade but this must be removed in the first few years or growth will suffer[185]. Very slow growing for its first few years, growth soon becomes extremely fast with new shoots of up to 1.2 metres a year[185]. This annual increase can be maintained for many years[185]. Trees in sheltered Scottish valleys have reached 55 metres in 100 years[200]. New growth takes place from May to July[185]. The trees require abundant rainfall for good growth[11, 49]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm. Larger trees will check badly and hardly put on any growth for several years. This also badly affects root development and wind resistance[200]. Trees are very long-lived, specimens over 1,000 years old are known[226]. Seed production commences when trees are about 10 years old, though good production takes another 15 - 20 years[229]. Good crops are produced about every 6 years[229]. This tree is a pioneer species because it cannot reproduce under its own canopy[226]. The bark on mature trees can be 30cm thick, and this insulates the trunks from the heat of forest fires[213]. This species is notably resistant to honey fungus[81, 200]. Young growth can be damaged by late frosts[81]. The leaves have a strong sweet fruity aroma[185]. **Special Features:** North American native, Inconspicuous flowers or blooms.

4.2.151 *Picea mariana*

Black Spruce, Swamp Spruce

3 tlin 5 cyuc 2 kcak 0 tcan 2 dwat m hkuc
htut cyutil tcupha7n hwicli hrasjlutnyik hpa7ti frusflatprik
hpa7tmwatli hjonli

drutta *Picea mariana* is an evergreen Tree growing to 20 m (65ft) by 4 m (13ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in leaf all year, and the seeds ripen from October 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 Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. 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. The plant can tolerate strong winds but not maritime exposure. It cannot tolerate atmospheric pollution.

pcista The sawdust, the resin from the trunk and even the needles can cause dermatitis in some people[222].

kcakta Edible Parts: Flowers Inner bark Seed **Seed-podEdible Uses:** Condiment Drink Gum TeaYoung male catkins - raw or cooked. Used as a flavouring[172]. Immature female cones - cooked. The central portion, when roasted, is sweet and syrupy[172]. The cones are 1 - 4cm in diameter[82]. Inner bark - cooked[257]. It is usually harvested in the spring and can be dried, ground into a powder and then used as a thickener in soups etc or added to cereals when making bread[172, 213]. An emergency food, it is only used when all else fails. Seed - raw[172]. The seed is about 2 - 4mm long[229] and is too small and fiddly to be worthwhile unless you are desperate[172]. A refreshing tea, rich in vitamin C, can be made from the young shoot tips[172, 213]. A tea is also made from the needles and the bark[21, 102]. A gum obtained from the bark is collected in considerable quantities and used for chewing[82, 177]. Hardened blobs make an excellent chewing gum[226]. It should be aged for 3 days or more before using it[102]. The best gum is obtained from the southern side of the tree[46]. Another report says that the gum, called 'spruce gum', is a resinous exudation collected from the branches[183]. A source of 'spruce oil', used commercially for flavouring[183]. The young twigs are boiled with molasses, sugar etc and then fermented to produce 'Spruce beer'[183, 257]. The beer is ready to drink in a week and is considered to be a good source of minerals and vitamins[226].

tcanta Disinfectant Dye Gum Pitch String Waterproofing WoodA yellow-orange dye is obtained from the cones[106]. Various native North American Indian tribes made a string from the long roots of this species and used it to stitch the

of their canoes, to sew baskets etc[226, 257]. The pitch obtained from the trunk has been used as a sealing material on the hulls of canoes[257]. Wood - light, soft, not strong[82, 171]. It weighs 28lb per cubic foot[235]. Since it is a smaller tree than the other spruces, it is not an important lumber source for uses such as construction[226]. However, it is widely used for making boxes, crates etc[226], and is valued for its use in the pulp industry to make paper, plus it is also used as a fuel[171, 229].

dwatta Antiinflammatory Disinfectant Kidney Odontalgic Poultice Salve Skin Stomachic TB Vitamin C Vulnerary A poultice of the inner bark has been applied to inflammations[222, 257]. A tea made from the inner bark is a folk remedy for kidney stones, stomach problems and rheumatism[222]. An infusion of the roots and bark has been used in the treatment of stomach pains, trembling and fits[257]. A resin from the trunk is used as a poultice and salve on sores to promote healing[222, 257]. The resin can be mixed with oil and used as a dressing on purulent wounds, bad burns, skin rashes, scabies and persistent scabs[257]. The resin can be chewed as an aid to digestion[257]. A decoction of the gum or leaves has been used in treating respiratory infections and kidney problems[257]. An infusion of the leaves has been used as a bath or a rub in treating dry skin or sores[257]. A decoction of the young twigs has been used in the treatment of coughs[257]. A decoction of the cones has been drunk in the treatment of diarrhoea[257]. A decoction has been used externally as a gargle to treat sore throats[257]. The cones have been chewed to treat a sore mouth and toothaches[257].

nrakta Northern N. America - Alaska to Newfoundland and south to British Columbia and W. Virginia.. ksacta Cool slopes and bogs[43]. Found on well-drained soils in the north of its range and swamps in the south[82]. Found on a variety of soil types[229], it grows best in those that are moist and acidic[226]

propta Seed - stratification will probably improve germination so sow fresh seed in the autumn in a cold frame if possible[80]. Sow stored seed as early in the year as possible in a cold frame[78]. A position in light shade is probably best[78]. Seed should not be allowed to dry out and should be stored in a cool place[80]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the greenhouse or cold frame for their first winter. They can be planted out into their permanent positions in early summer of the following year, or be placed in an outdoor nursery bed for a year or so to increase in size. They might need protection from spring frosts. Cuttings of semi-ripe terminal shoots, 5 - 8cm long, August in a frame. Protect from frost. Forms roots in the spring[78]. Cuttings of mature terminal shoots, 5 - 10cm long, September/October in a cold frame. Takes 12 months[78]. Cuttings of soft to semi-ripe wood, early summer in a frame. Slow but sure. Layering. Lower branches often layer naturally in the wild[226].

nwatta Landscape Uses: Screen, Specimen. Likes abundant moisture at the roots, if grown in drier areas it must be given a deep moist soil[11]. Tolerates poor peaty soils[200]. Succeeds in wet cold and shallow soils but is not very wind-firm in shallow soils[1]. Prefers a pH between 4 to 6[200] and dislikes shallow chalky soils[11]. Dislikes shade[200]. Intolerant of atmospheric pollution[11]. Resists wind exposure[49, 200]. This tree is one of the most widespread and abundant species in N. America where it is extensively utilized as a timber tree[226]. A short lived and slow growing tree both in the wild and in cultivation[81, 185, 229]. New growth takes place from early May to the end of June and rarely exceeds 60 cm even when young and is less as the tree grows old[185]. Trees have been planted experimentally as a timber crop in N. Europe[50] (this appears to contradict the previous statement that the tree is slow growing. The reason is probably that it is either planted in areas too harsh for most trees to grow or it is only slow growing in milder areas such as Britain[K]). A prolific seed-producer, usually beginning to bear cones at around 10 years of age[229]. In some upland areas, especially over granitic or other base-poor soils, growth rate and health have been seriously affected by aluminium poisoning induced by acid rain[200]. Closely related to *P. rubens*[229]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. Trees should be planted into their permanent positions when they are quite small, between 30 and 90cm. Larger trees will check badly and hardly put on any

growth for several years. This also badly affects root development and wind resistance[200]. Lower branches often self-layer and form a ring of stems around the parent plant[188]. There are some named forms, selected for their ornamental value[188]. The crushed foliage has a strong scent of balsam or lemon balm[185]. Special Features: North American native, Inconspicuous flowers or blooms.

4.2.152 Hemiptelea davidii

3 tlin 7 cyuc 2 kcaak 0 tcan 1 dwat 15 m hkuc hmimhtut cyutli tcup hwicli hras|lutnyik hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

drutta Hemiptelea davidii is a deciduous Tree growing to 15 m (49ft 3in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in April, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Leaves Oil Edible Uses: Oil Tea Young leaves - cooked. Mixed with rice dumplings[177]. The tender leaves make a good beverage[266].

tcanta Fibre Hedge Hedge Oil Wood Plants are grown as a hedge in China[109]. The fibre from the bark is used for manufacturing staple rayon and sacks[266]. An oil is extracted from the seeds[266]. The report does not say if the oil is edible, nor does it give any uses. Wood - hard. It is used for making utensils[266].

dwatta Demulcent Diuretic Febrifuge Lenitive Demulcent, diuretic, febrifuge, lenitive[178].

nrakta E. Asia - China, Korea. ksacta Hedges, loess banks, banks of soil and debris[109]. Hill slopes and trailsides, often planted when found around houses, at elevations below 2000 metres[266].

propta Seed - best harvested as soon as it is ripe but before it has fully dried on the plant and sown immediately in a cold frame. Stored seed requires stratification and should be sown as soon as possible[200]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Seed can be stored cold and dry[200].

nwatta Prefers a deep moist loamy soil, succeeding in acid and alkaline conditions[200]. Relatively shade tolerant[200]. Plants are probably resistant to Dutch Elm disease[200]. Plants can be hermaphrodite or monoecious.

4.2.153 Secale cereale ancestrale

Rye

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat m hkuc htut cyutli hgattcup hwicli hras|lutnyik hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

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

kcakta Edible Parts: Seed Edible Uses: Seed - cooked[105, 177]. It can be ground into a flour and used as a cereal in making bread, biscuits etc.

nrakta W. Asia. ksacta Sandy places in vineyards, field edges etc, 100 - 1370 metres in Turkey[93].

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

nwatta We have very little information on this species and do not know if it will succeed in Britain, though it should succeed as a spring-sown annual and possibly as an autumn sown plant. It is a primitive form of the cultivated cereal rye, *Secale cereale*[177] and as such could be of value in breeding programmes. The following notes are based on the general

needs of the genus. Succeeds in most soils but prefers a well-drained light soil in a sunny position.

4.2.154 Sorbus aucuparia

Mountain Ash, European mountain ash

3 tlin 6 cyuc 2 kcaak 3 tcan 2 dwat 15 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli frusflat-
prlikwislip hpa7tmwatli xre7t hjonli

drutta Sorbus aucuparia is a deciduous Tree growing to 15 m (49ft) 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 from May to June, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid and very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure. It can tolerate atmospheric pollution.

pcista Large quantities of the raw fruit can cause vomiting, especially if people are not used to the fruit. Seeds probably contain hydrogen cyanide. this is the ingredient that gives almonds their characteristic flavour. Unless the seed is very bitter it should be perfectly safe in reasonable quantities. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit Leaves OilEdible Uses: Coffee Oil TeaFruit - raw or cooked[2, 3, 5, 7, 9]. The fruit is very acid and large quantities of the raw fruit can cause stomach upsets[10, 13]. It can be used to make delicious, if slightly acidulous, jams and preserves[7], the fruit can also be dried and used as a flour mixed with cereals[2, 66]. The fruit is about 7.5mm in diameter[200] and is produced in quite large bunches making harvest easy[K]. The leaves and flowers are used as a tea substitute[61, 183]. Young leaves are said to be a famine food but they contain a cyanogenic glycoside so you should be very hungry before even thinking of eating them[179]. A coffee substitute[183]. The report was referring to the fruit, it probably means the roasted seed.

tcanta Cosmetic Dye Oil Shelterbelt Tannin WoodAn oil is obtained from the seed[13]. A cosmetic face-mask is made from the fruits and is used to combat wrinkled skin[7]. A black dye is obtained from the young branches[74]. All parts of the plant contain tannin and can be used as a black dye[4]. Trees are very wind resistant and can be used in shelterbelt plantings[11, 200]. Wood - hard, fine grained, compact and elastic. It is highly recommended by wood turners and is also used to make hoops for barrels, cogs and furniture[7, 13, 61, 74, 113].

dwatya Antirheumatic Antiscorbutic Aperient Astringent Diuretic Hypoglycaemic Laxative Vitamin CThe bark is astringent, it is used in the treatment of diarrhoea and as a vaginal injection for leucorrhoea etc[4]. The fruit is antiscorbutic and astringent[4, 7]. It is normally used as a jam or an infusion to treat diarrhoea and haemorrhoids[254]. An infusion can also be used as a gargle for sore throats and as a wash to treat haemorrhoids and excessive vaginal discharge[254]. The seeds contain cyanogenic glycosides which, in reaction with water, produce the extremely toxic prussic acid[254]. In small quantities this acts as a stimulant to the respiratory system but in larger doses can cause respiratory failure and death[K]. It is therefore best to remove the seeds when using the fruit medicinally or as a food[254]. Both the flowers and the fruit are aperient, mildly diuretic, laxative and emmenagogue[9, 13, 21]. An infusion is used in the treatment of painful menstruation, constipation and kidney disorders[9].

nrakta Europe, including Britain, south and east from Iceland to Spain, Macedonia and the Caucasus. ksakta Woods, scrub and mountain rocks, mainly on lighter soil, rare or absent on clays or soft limestones. It is found at higher elevations than any other native tree[17].

propta Seed - best sown as soon as it is ripe in a cold frame[78, 80]. If you have sufficient seed it can be sown in an outdoor seedbed[78, 80]. Stored seed germinates better

if given 2 weeks warm then 14 - 16 weeks cold stratification[98], so sow it as early in the year as possible. Prick out the seedlings into individual pots when they are large enough to handle. Seedlings are very slow to put on top-growth for their first year or two[11], but they are busy building up a good root system. It is best to keep them in pots in a cold frame for their first winter and then plant them out into their permanent positions in late spring.

nwatta Landscape Uses:Specimen. Succeeds in most reasonably good soils in an open sunny position[11]. Grows well in heavy clay soils. Tolerates some shade[186], though it fruits better in a sunny position[K]. Prefers a cool moist position and a lighter neutral to slightly acid soil[11, 13, 200]. Dislikes shallow soils or drought[11, 200]. Succeeds on chalk or acid peats[98, 186]. A very wind firm tree tolerating very exposed and maritime positions[186, 200]. Tolerates atmospheric pollution[200]. Some named varieties have been developed for their improved fruits which are larger and sweeter than the type[183]. Plants, and especially young seedlings, are quite fast growing[186]. The fruit is very attractive to birds. 28 species of insects are associated with this tree[186]. Responds well to coppicing[186]. Plants are susceptible to fireblight[188]. Special Features:Not North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 7 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.2.155 Malus x adstringens

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprkli-
wis hpa7tmwatli xre7t hjonli

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

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

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked. A rather acid flavour. The fruit is about 4 - 5cm in diameter[200].

nrakta A hybrid species of garden origin, M. baccata x M. pumila. ksakta Not known in the wild.

propta Seed - this is a hybrid species and will not breed true. The seed is best sown as soon as it is ripe in the autumn in a cold frame. It usually germinates in late winter. Stored seed requires stratification for 3 months at 1°C and should be sown in a cold frame as soon as it is received[200]. It might

not germinate for 12 months or more. Prick out the seedlings into individual pots as soon as they are large enough to handle. If given a rich compost they usually grow away quickly and can be large enough to plant out in late summer, though consider giving them some protection from the cold in their first winter. Otherwise, keep them in pots in a cold frame and plant them out in late spring of the following year. Cuttings of mature wood, November in a frame[11].

nwatta An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. A very ornamental plant, there are a great many named varieties[200]. 'Robin', 'Hopa' and 'Tradescant' have all been mentioned for their edible fruit[200]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.156 *Cymbalaria muralis*

Kenilworth Ivy

3 tlin 7 cyuc 2 kcaak 0 tcan 1 dwat m hkuc
hmim cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flatprikliwis
hpa7tmwatli fyifxre7t hjonli

drutta *Cymbalaria muralis* is a PERENNIAL growing to 0.1 m (0ft 4in) by 0.4 m (1ft 4in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to September, and the seeds ripen from July to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland). It prefers dry or moist soil.

pcista The plant might be slightly toxic[76]

kcakta Edible Parts: LeavesEdible Uses: Leaves - raw[4, 115, 177]. The leaves have been used in salads, being acrid and pungent like cress[4]. We find them rather bitter and not very pleasant, though they are available all year round and so might be useful in the winter[K]. Some caution is advised, see the notes above on toxicity.

tcanta DyeA clear yellow dye is obtained from the flowers, though it is not very permanent[4, 115].

dwatta Antiscorbutic VulneraryThe herb is antiscorbutic and vulnerary[4, 7]. It is used externally as a poultice on fresh wounds to stop the bleeding[7]. There are reports that it has been used with success in India for the treatment of diabetes[4, 240].

nrakta S. Europe. Naturalized in Britain. ksacta Walls and other well-drained sites, shady rocks and woods, usually on calcareous soils[17, 50].

propta Seed - surface sow March to June in a cold frame and do not exclude light. The seed usually germinates in 2 - 4 weeks at 18°C[164]. When they are large enough to handle, prick the seedlings out into individual pots and plant them out into their permanent positions in the summer. Division in late spring. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Prefers a moderately good soil and some shade[1]. Plants usually self-sow freely[188] and can be invasive, especially when grown on old walls[200]. They succeed both on dry-stone walls and on old mortared walls[219].

4.2.157 *Thuja occidentalis*

American Arbor-Vitae, Arborvitae, Eastern Arborvitae, Siberian Arborvitae, Northern White Cedar. Wh
3 tlin 7 cyuc 2 kcaak 0 tcan 3 dwat 15 m hkuc
hmimhut cyutli tcuphja7n hwicli hrasjlutnyikfrip hpa7tli flat-
prikliwis hpa7tmwatli hjonli

drutta *Thuja occidentalis* is an evergreen Tree growing to 15 m (49ft) by 5 m (16ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in leaf all year, in flower from April to May, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be

found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil.

pcista An essential oil from the leaves is poisonous if taken in large doses[7, 65]. Nausea, vomiting, flatulence, indigestion reported. Possible asthma and seizures [301]. This plant should not be used by pregnant women[165]. Use oil internally in small quantities and under medical supervision. Death and convulsions reported with improper internal use [301].

kcakta Edible Parts: StemEdible Uses: TeaPith of young shoots - cooked[105]. It can be added to soups[177]. Pleasantly sweet, the pith was used as the basis of the soup according to one report[183]. Inner bark - cooked. It is only used in times of emergency or scarcity[213]. The inner bark can be dried and ground into a powder, then used with wheat or other cereals in making bread, biscuits etc. The leafy branchlets are used as a tea substitute[159, 177, 257] but are probably best avoided by pregnant women[165]. An aromatic flavour[183]. Another report says that the foliage and bark are used, the resulting tea is a good source of vitamin C[226].

tcanta Broom Essential Fibre Incense Repellent Tannin WoodTolerant of regular trimming, though not into the old wood, it can be grown as a hedge[226]. The fresh branches are used as besoms[4]. Their aromatic smell serves to deodorize the house whilst sweeping[226]. The leaves have been kept in the clothes cupboard as a perfume, incense and insect repellent[257]. The leaves and stems have been used as an incense[257]. An essential oil is obtained from the leaves and branches, it is used in perfumery and in medicines[46, 57, 61, 226]. It is poisonous if taken internally[65]. This essential oil also has insect repellent properties[106]. The tough and stringy bark has been used to weave fibre bags[257]. The bark is a source of tannin[257]. Wood - light, soft, not strong, brittle, coarse grained, very durable, easily worked, does not warp[61, 82, 171, 226, 235]. It weighs 20lb per cubic foot[235]. Used especially where contact with water cannot be avoided, for canoes, garden buildings, shingles, posts etc[11, 61, 82, 171, 226].

dwatta Alternative Anthelmintic Antiinflammatory Antirheumatic Antiseptic Antiviral Aromatic Astringent Diaphoretic Diuretic Emmenagogue Homeopathy Rubefacient Vitamin CAmerican arbor-vitae was much used by many native North American Indian tribes as a medicine to treat fevers, coughs, headaches, swollen hands and rheumatic problems[254, 257]. The plant has an established antiviral activity and is most commonly used in modern herbalism to treat warts and polyps, being prescribed both internally and externally for these conditions[254]. The plant can be used to induce menstruation and so should not be prescribed for pregnant women[238]. The recently dried leafy young twigs are alterative, anthelmintic, anti-inflammatory, antiseptic, aromatic, astringent, diaphoretic, diuretic and emmenagogue[4, 7, 21, 165]. The plant is being used internally in the treatment of cancer[238], especially cancer of the uterus[254]. A tea made from the leaves is used in the treatment for bronchitis and other respiratory problems, colds, headaches and as a cough syrup[222, 254]. The plants diuretic properties make it useful in treating acute cystitis and bed-wetting in children[254]. The leaves are used in steam baths in the treatment of rheumatism, arthritis, colds etc[222]. Externally, the leaves are used as a wash for swollen feet and burns[222]. Extracts of the leaves can be painted on painful joints or muscles as a counterirritant, improving local blood supply and thus facilitating the removal of toxins, easing pain and stiffness[254]. A tincture of the leaves has been used in the treatment of warts, piles, bed sores and fungal infections[222]. The leaves and young twigs can be harvested as required and used fresh or dried[238]. 'Oil of white cedar', obtained from the leaves, is an essential oil that is antiseptic, expectorant and rubefacient[213, 222]. It is used internally to promote menstruation and relieve rheumatism[213]. This volatile oil is toxic and poisoning from overdoses has occurred[213], it should only be used under the supervision of a qualified practitioner and should not be prescribed for pregnant women[238]. The oil also stimulates the heart and causes convulsions in high doses[213]. A tea of the inner bark is used to promote menstruation[213] and

the treatment of consumption and coughs[222]. A homeopathic remedy is made from the leaves and twigs, gathered when the tree is flowering[232]. It is used in the household as a treatment against warts, but also has a range of other applications that should only be prescribed by a competent homeopath[7, 232].

nrakta Eastern N. America - Nova Scotia to Georgia, west to Illinois and Minnesota. ksacta Swamps and cool rocky banks of streams[43], forming dense almost impenetrable forests[82, 165]. Also found on rocky soils[226]. Plants are usually found on neutral to alkaline limestone soils[226].

propta Seed - best sown when ripe in the autumn in a cold frame[113]. Stored seed germinates best if given a short cold stratification[113]. It can be sown in a cold frame in late winter. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. If growing large quantities of plants, the seed can be sown in an outdoor seed bed in mid spring[78]. Grow the plants on for two years and then plant them out into their permanent positions in late autumn or early spring. Cuttings of half-ripe wood, 5 - 8cm with a heel, July/August in a shaded frame. Forms roots by the end of September but it should be overwintered in a frame[78]. Cuttings of almost ripe wood, 5 - 10cm with a heel, September in a cold frame. Forms roots in the following summer. Plant out in autumn or spring[78].

nwatta Landscape Uses: Firewood, Hedge, Screen, Superior hedge, Specimen. Prefers a permanently moist soil[1], it is intolerant of dry soils[11]. A useful plant for very poorly-drained soils[185, 200]. The best stands in America are on well-drained soils[11]. Grows well in heavy clay soils. Succeeds in sandy soils[188] and on chalk[200]. A very hardy tree, tolerating very cold winters with temperatures down to -46°C[200, 238]. In cold weather the leaves turn brown, becoming green again in the spring[226]. It is usually slow growing and short-lived in cultivation in Britain and rarely looks thrifty[81, 185]. However, there are some good specimens in western Britain[4, 14]. Some cultivars are more healthy, 'Lutea' is growing very well in several places and 'Spiralis' is also growing well[185]. Trees live 200 - 300 years in the wild[226]. Sometimes planted as a timber tree in C. Europe[50]. Plants cannot regenerate from old wood. Pruning is not normally necessary for this species, any pruning that is carried out should be done with care[238]. The wood and the foliage are strongly aromatic[226]. The crushed leaves have a scent of apples[185]. Special Features: Attracts birds, North American native, Wetlands plant, Inconspicuous flowers or blooms.

4.2.158 Malus x robusta

3 tlin 7 cyuc 2 kcak 0 tcan 0 dwat 12 m hkuc
hmmhtut cyutli tcup hwicli hrasjlutnykfrip hpa7tli flatprik-
lwis hpa7tmwatli xre7t hjonli

drutta Malus x robusta is a deciduous Tree growing to 12 m (39ft) by 10 m (32ft). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[183]. The fruit is rather variable in size and is usually

about 1 - 3cm in diameter[200]. A firm and juicy flesh with rather an acid flavour, we found it pleasant in small quantities when fully ripe[K].

tcanta Rootstock Used as a vigorous winter-hardy rootstock for the cultivated apple, *M. sylvestris domestica*, it is somewhat resistant to fireblight but susceptible to crown rot[183].

nrakta A hybrid of garden origin, *M. baccata* x *M. prunifolia*. ksacta Not known in the wild.

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

nwatta An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. There are some named varieties, selected for their ornamental value[183]. 'Fairy' and 'Joan' both have larger fruits than the type, up to 4cm in diameter[200]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.159 Betula populifolia

Grey Birch

3 tlin 6 cyuc 2 kcak 3 tcan 1 dwat 12 m hkuc
htut cyutli kyuctcup hwicli hyshrasjlutnykfrip hpa7tli flat-
priklwis hpa7tmwatli hjonli

drutta *Betula populifolia* is a deciduous Tree growing to 12 m (39ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in April, and the seeds ripen in September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant is not wind tolerant.

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: Inner bark Sap Edible Uses: Inner bark - cooked or dried and ground into a meal. The meal can be used as a thickener in soups etc, or be added to flour when 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[177, K]. Sap - sweet. Harvested in early spring, before the leaves unfurl, by tapping the trunk. The flow is best on warm days that follow frosty nights. The sap is drunk as a sweet beverage or it can be fermented to make birch beer or vinegar[177, 183]. 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].

tcanta Charcoal Pioneer Wood A pioneer species, readily invading old fields, burnt-over or cleared land and providing suitable conditions for other woodland trees to become established[226]. It is an excellent crop for very poor soils, where it grows rapidly and affords protection to the seedlings of more valuable and slower-growing trees[82]. Since this species is short-lived and not very shade tolerant, it is eventually out-competed by these other trees[226]. Wood - close-

soft, light, weak, not durable[61, 82, 229, 235]. It weighs 36lb per cubic foot[235]. Unimportant commercially, the wood is used locally for making clothes pegs, spools, pulp, charcoal and quite commonly as a fuel[61, 82, 229].

dwatta Antiseborrheic Astringent Urinary The bark is astringent. a decoction has been used to treat bleeding piles[257]. Scrapings of the inner bark have been used to treat swellings in infected cuts[257]. 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 Eastern N. America - Quebec to Virginia and west to Indiana ksacta Found on the margins of swamps and ponds, it also commonly grows in dry sandy or gravelly barren soils, growing well in poor almost sterile soils[82, 229].

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. Succeeds in a well-drained loamy soil in a sunny position[11, 200]. Tolerates most soils doing well on poor ones[1] and on heavy clays. A fast growing tree, though it rarely lives longer than 50 years[200, 229]. It is a pioneer species of abandoned fields, burnt-over lands, cleared woodlands etc[200, 229]. A fairly wind-tolerant plant[200], but it is shallow-rooted and older trees are often uprooted by winds and heavy snow in the wild[229]. Hybridizes freely with other members of this genus[50], especially with *B. papyrifera*[43]. A good plant to grow near the compost heap, aiding the fermentation process[20]. Trees are notably susceptible to honey fungus[200]. Special Features: North American native, Naturalizing, Inconspicuous flowers or blooms.

4.2.160 *Pinus aristata*

Bristle-Cone Pine

3 tlin 10 cyuc 2 kcaak 2 tcan 2 dwat 12 m hkuc

htut cywtli hqatkyuctup hwicli hyshrasljut hpa7tli flatprik hpa7tmwatli dyat hjonli

drutta *Pinus aristata* is an evergreen Tree growing to 12 m (39ft) by 4 m (13ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf all year, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

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

kcakta Edible Parts: Seed Edible Uses: Condiment Seed - raw or cooked[160]. Up to 6mm long[200]. The oil-rich seed has a slightly resinous flavour. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Dye Herbicide Preservative Wood Landscape Uses: Screen, Specimen. A tan or green dye is obtained from the needles[168]. The tree could be the source of antioxidants that contribute to long life[160]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. Oleo-resins are present in the tissues of all species of pines, but these are

often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. Wood - light, soft, not strong. Used for fuel and mining timber[46]. Special Features: Attractive foliage, North American native, Inconspicuous flowers or blooms. Can be grown in pots.

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, 257].

nrakta South-western N. America - Colorado to New Mexico. ksacta Dry rocky slopes, often in pure stands, 2250 - 3450 metres in California[71]. Trees grow right up to the tree line, where they are no more than gnarled shrubs[229].

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

nwatta Thrives in a light well-drained sandy or gravelly loam[1]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. A wind tolerant tree, it often grows on very exposed ridges in the wild[229]. Trees grow best in areas with cold dry summers, the largest cultivated specimen is in dry sub-continental north-east Iceland[200]. A very slow growing[81] (to 6 metres in 60 years at Kew) and short-lived tree in Britain, though it lives for 2000 years or more in its native range[11, 185]. This is the oldest known living plant with specimens over 4000 years old[188]. This species is closely related to *P. balfouriana*[11]. The cones open and shed their seed whilst still attached to the tree[226]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. Leaf secretions inhibit the germination of seeds, thereby inhibiting the growth of other plants below the tree[18]. Plants in this genus are notably susceptible to honey fungus[200]. Heat zone: 9-1.

4.2.161 *Malus yunnanensis*

Crabapple

3 tlin 8 cyuc 2 kcaak 0 tcan 0 dwat 10 m hkuc

hmimhtut cywtli tcup hwicli hrsasljutnykrip hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta *Malus yunnanensis* is a deciduous Tree growing to 10 m (32ft) by 6 m (19ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in May, and the seeds ripen from Septem-

ber to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[105, 177]. A gritty texture[1]. The fruit is harsh and acid[11], though it improves somewhat when it has been frosted[K]. Quite small, it is 10 - 15mm in diameter[200].

tcanta Rootstock The plant is very adaptable to poor environmental conditions and can be used as stock for grafting apple trees in W China[266].

nrakta E. Asia - China. ksacta Mixed forests on slopes or by streams in valleys at elevations of 1600 - 3800 metres in Guizhou, Hubei, Sichuan and Yunnan Provinces[266].

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

nwatta Landscape Uses: Border, Standard, Specimen, Street tree. An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Not North American native, Fragrant flowers, Attractive flowers or blooms.

4.2.162 Acer spicatum

Mountain Maple

3 tlin 6 cyuc 2 kcak 0 tcant 2 dwat 10 m hkuc
htut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik
hpa7tmwatli xre7t hjonli

drutta Acer spicatum is a deciduous Tree growing to 10 m (32ft 10in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower in May, and the seeds ripen in August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. 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 and neutral soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Sap Edible Uses: Sweetener A sugar is obtained from the sap. The sap can be used as a drink or boiled down to make maple syrup[183]. The syrup is used as a sweetener on many foods. The sap can be harvested in late winter, the flow is best on a warm sunny day after a frost. Trees on southern slopes in sandy soils give the best yields. The best sap production comes from cold-winter areas with continental climates.

tcanta Preservative Soil stabilization Tannin The leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. The bark contains tannins, but the report does not say in what quantity[223]. The trees have an extensive root system that can be used to bind the soil. They are often

grown on banks in order to prevent soil erosion[226]. The wood is close-grained, soft and light, weighing 33lb per cubic foot[82, 235].

dwatta Astringent Ophthalmic Poultice The North American Indians made an infusion of the pith of young twigs and used this as eye drops to soothe irritation caused by campfire smoke[226, 257]. The pith itself was used to remove foreign matter from the eyes[257]. An infusion or poultice made from the outer bark has been used to treat sore eyes[257]. A poultice made from boiled root chips has been applied externally to wounds and abscesses[257]. A compound infusion of the roots and bark is used to treat internal haemorrhage[257].

nrakta North-eastern N. America - Saskatchewan to Labrador, south to Wisconsin and Georgia. ksacta Deep rich moist soils in cool habitats such as the edges of mountain streams, ravines or woodlands[229].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Plants often self-layer in the wild[226]. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter. Strong plants are usually produced by this method.

nwatta Landscape Uses: Specimen, Woodland garden. Of easy cultivation, it prefers a sunny position and a good moist well-drained soil but succeeds on most soils, especially those on the acid side, and dislikes alkaline soils[182]. Grows well in heavy clay soils. Plants are hardy to about -35°C when fully dormant. The lower branches of trees often self-layer, the trees then forming an impenetrable thicket[226]. Most maples are bad companion plants, inhibiting the growth of nearby plants[18, 20]. Special Features: North American native, Attractive flowers or blooms.

4.2.163 Acer glabrum

Rock Maple, Rocky Mountain maple, Douglas maple, Greene's maple, New Mexico maple, Torrey maple
3 tlin 8 cyuc 2 kcak 0 tcant 9 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik
wis hpa7tmwatli nyanhjen hjonli

drutta Acer glabrum is a deciduous Tree growing to 9 m (29ft 6in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in April, and the seeds ripen in September. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Inner bark Leaves Seed Edible Uses: Condiment Edible young shoots - cooked. They are used like asparagus[85]. The seedlings, gathered in early spring, are eaten fresh or can be dried for later use[213]. The dried crushed leaves have been used as a spice[257]. Seeds - cooked. The wings are removed and the seeds boiled then eaten hot[213]. The seeds are about 6mm long[82]. Inner bark[85]. No more details are given but inner bark is often dried, ground into a powder and then used as a thickening in soups etc or mixed with cereals when making bread. An emergency food, it is usually only used when all else fails[85].

tcanta Containers Fibre Fuel Preservative Wood The leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. A fibre obtained from the inner bark

Use for making mats, rope etc[99, 257]. The bark has been used to make spoons, paint containers etc[257]. Wood - tough, hard, heavy, close grained, pliable[82, 99]. It weighs 37lb per cubic foot[235]. The wood can also be used as friction sticks[99]. The green wood can be moulded.[99] The wood is too small for commercial exploitation, though it makes a good fuel[99, 229]. It was often used by native North American Indian tribes for making small items such as snowshoes, drum hoops, bows and pegs[257].

dwatta Antiemetic Birthing aid Cathartic Galactagogue A decoction of the wood and bark is said to cure nausea[213]. Another report says that this is specifically the nausea caused by smelling a corpse[257]. An infusion of the bark has been used as a cathartic[257]. A decoction of the branches, together with the branches of *Amelanchier* sp., was used to heal a woman's insides after childbirth and also to promote lactation[257].

nrakta Western N. America - Alaska to California, west to New Mexico. ksacta Edges of mountain streams, on rocks and in coniferous woods, 1500 - 2000 metres[82, 184].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. The seed has a hard coat and can be slow to germinate, often taking 2 years. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter. It is very difficult to find suitable wood for cuttings.

nwatta Landscape Uses:Erosion control, Massing. Of easy cultivation, it succeeds in any soil, preferring a good moist well-drained soil[11]. Prefers a sunny position but tolerates some shade[11, 200]. Grows well in heavy clay soils. Chlorosis can sometimes develop as a result of iron deficiency when the plants are grown in alkaline soils, but in general maples are not fussy as to soil pH. Hardy to about -25°C[184]. This species grows well at Kew, a specimen was 12 metres tall in 1967[11]. The tree is almost fastigiate[11]. Most maples are bad companion plants, inhibiting the growth of nearby plants[18, 20]. Trees are usually dioecious. Male and female trees must be grown if seed is required[226]. Special Features:North American native, Inconspicuous flowers or blooms.

4.2.164 *Acer tataricum*

Tatarian Maple

3 tlin 7 cyuc 2 kcaok 0 tcan 0 dwat 9 m hkuc
hmmimhtut cyutli tcup hwicli hrasljutnyikfrip hpa7tli flatprik-
wis hpa7tmwatli hjonli

drutta *Acer tataricum* is a deciduous Tree growing to 9 m (29ft 6in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. It is 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 Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Sap Seed Edible Uses: Sweetener The sap contains a certain amount of sugar and can either be used as a drink, or can be concentrated into a syrup by boiling off the water[74]. The syrup is used as a sweetener on many foods. The concentration of sugar is considerably lower than in the sugar maples (*A. saccharum*). The tree trunk is tapped in the early spring, the sap flowing better

on warm sunny days following a frost. The best sap production comes from cold-winter areas with continental climates. Seed - cooked[105, 177]. The wings are removed and the seeds are then boiled[2].

tcanta Companion Preservative The leaves are packed around apples, rootcrops etc to help preserve them[18, 20].

nrakta S.E. Europe, W. Asia. ksacta Found in deciduous oak scrub, rocky slopes and river valleys at altitudes between 500 - 1700 metres in Turkey[93].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter.

nwatta Landscape Uses:Container, Pollard, Standard, Specimen, Street tree. Of easy cultivation, it prefers a good moist well-drained soil on the acid side and a sunny position[11, 182]. Grows well in heavy clay soils. Chlorosis can sometimes develop as a result of iron deficiency when the plants are grown in alkaline soils, but in general maples are not fussy as to soil pH. Trees usually fruit abundantly in Britain[11]. A bad companion plant, inhibiting the growth of nearby plants[18, 20]. Special Features:Not North American native, Fragrant flowers, Inconspicuous flowers or blooms.

4.2.165 *Celastrus scandens*

Climbing Bittersweet, American bittersweet

3 tlin 8 cyuc 2 kcaok 0 tcan 2 dwat 8 m hkuc
pcimhmmhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprik-
hpa7tmwatli nyanhjen hjonli

drutta *Celastrus scandens* is a deciduous Climber growing to 8 m (26ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from July to August, and the seeds ripen in October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Bees. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid and neutral soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The fruit is poisonous[222]. All parts of the plant are potentially toxic[222].

kcakta Edible Parts: Stem Edible Uses: Bark and twigs - they must be cooked[105]. The thickish bark is sweet and palatable after boiling[2, 161, 177]. Another report says that it is the inner bark that is used, and that it is a starvation food, only used when other foods are in short supply[257]. Some caution is advised in the use of this plant since there are suggestions of toxicity.

dwatta Analgesic Antirheumatic Cancer Cardiac Diaphoretic Diuretic Dysentery Emetic Skin Climbing bitter-sweet was employed medicinally by a number of native North American Indian tribes, though it is scarcely used in modern herbalism[257]. The root is diaphoretic, diuretic and emetic[222]. It is a folk remedy for chronic liver and skin ailments (including skin cancer), rheumatism, leucorrhoea, dysentery and suppressed menses[222]. A strong compound infusion, usually combined with raspberry leaf tea, has been used to reduce the pain of childbirth[257]. A poultice of the boiled root has been used to treat obstinate sores, skin eruptions etc[257]. Externally, the bark is used as an ointment on burns, scrapes and skin eruptions[222]. Extracts of the bark are thought to be cardioactive[222]. Many plants in this

genus contain compounds of their antitumour activity[218].

nrakta Eastern N. America - Quebec, south to North Carolina and New Mexico. ksacta Rich soils[235] in dense moist thickets, woods and along river banks[43, 268].

propta Seed - gather when ripe, store in dry sand and sow February in a warm greenhouse[78]. Three months cold stratification leads to a higher germination rate[113]. Remove the flesh of the fruit since this inhibits germination[113]. Germination rates are usually good[78]. When 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. Layering in August of the current seasons growth. Takes 12 months[78]. Root cuttings, 6mm thick 25mm long in December. Plant horizontally in pots in a frame[78].

nwatta Landscape Uses:Arbor. Prefers a deep loamy soil[11]. Dislikes chalky soils[108]. Succeeds in full or partial shade[188]. Requires a humus-rich soil if it is to be at its best[219]. A rampant climber, it requires ample space and is best grown into an old tree. It climbs by means of twining and also by prickles on the young stems[182]. Plants do not normally require pruning[219]. The foliage of some wild plants is variegated[235]. There are some named forms, selected for their ornamental value[200]. A good bee plant[108]. Plants in this genus are notably resistant to honey fungus[200]. Plants are usually dioecious, in which case male and female plants must be grown if seed is required[182]. This species seldom fruits freely in Britain[182]. Special Features: Attracts birds, North American native, Invasive, Attracts butterflies, Suitable for dried flowers, Inconspicuous flowers or blooms.

4.2.166 Viburnum prunifolium

Stagberry, Black Haw, Hybrid blackhaw, Smooth Blackhaw, Blackhaw Viburnum

3 tlin 9 cyuc 2 kcaak 0 tcan 3 dwat 7.5 m hkuc
hmmihtut cyutli kyuctcup hwicli hyishrasjlutnyik hpa7tli flatprikhwis hpa7tmwatli dyatxre7t hjonli

drutta Viburnum prunifolium is a deciduous Tree growing to 7.5 m (24ft) by 5 m (16ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. 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 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.

pcista Overdose symptoms include: nausea, dizziness, fits (seizures), visual disturbances, increased perspiration, reduced pulse rate. Rare allergic reactions. Avoid during pregnancy due to effects on the uterus [301].

kakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[11, 159, 227]. The fruit is somewhat variable in size and quality, the best forms are nice raw whilst others are used for making preserves etc[183]. The taste is best after a frost[22, 46, 61]. The ovoid fruit is about 17mm long and contains a single large seed[200].

tcanta Hedge Hedge WoodPlants can be grown as a hedge, they can be sheared to make a formal screen[200]. Wood - heavy, hard, strong, brittle, close grained[82]. It weighs 52lb per cubic foot, but is of no commercial importance due to the small size of the trees[227, 229].

dwatta Abortifacient Anodyne Antispasmodic Astringent Birthing aid Dysentery Nervine SedativeStagberry was used by the North American Indians to treat dysentery and to arrest haemorrhage of the uterus[254, 257]. It is now considered to be a specific treatment for the relief of menstrual pain - the bark contains 'scopoletin', a coumarin that has a sedative affect on the uterus and salicin, a painkiller that is used in making aspirin[238, 254]. The bark of the root and stems is abortifacient, anodyne, antispasmodic, astringent, nervine and sedative[9, 46, 165, 222]. A tea is used internally in the treatment of painful or heavy menstruation, prolapse of the uterus, morning sickness, to prevent miscarriage and to relieve spasms after childbirth[222, 238, 254]. It is also used

to treat convulsive disorders, colic and other cramping pains that affect the bile ducts, hysteria, asthma and palpitations of a nervous origin[238, 254]. The stem bark is harvested in the autumn before the leaves change colour, or in the spring before the leaf buds open[238]. The root bark is only harvested in the autumn[254]. Both barks can be dried for later use[238].

nrakta Eastern N. America - Connecticut to Florida, west to Texas and Kansas. ksacta Thickets, woodland borders, shores etc[43], and on dry rocky hillsides[3, 82].

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, Screen, Specimen. An easily grown plant, succeeding in most soils[1]. Unlike other members of the genus, this species grows well on poor soils and in dry situations[200]. 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 -40°C[200]. Plants 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:Attracts birds, Attractive foliage, North American native, Attracts butterflies, Fragrant flowers, Attractive flowers or blooms.

4.2.167 Malus angustifolia

Southern Crab, Southern crab apple

3 tlin 8 cyuc 2 kcaak 0 tcan 0 dwat 7 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikhwis hpa7tmwatli xre7t hjonli

drutta Malus angustifolia is a deciduous Tree growing to 7 m (23ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[61, 105]. A fragrant aroma, but the fruit is harsh and acid[11]. The hard sour fruits are often used for making

preserves, cider, jellies etc[46, 82, 183]. The fruit is about 25mm in diameter and is slightly pear-shaped[200].

tcanta WoodWood - hard, heavy, close grained[46, 61, 82, 229]. It weighs 43lb per cubic foot[235]. Of no commercial value, but it is used locally for making levers, tool handles and other small objects[46, 61, 82, 229].

nrakta Eastern N. America - Maryland to Florida, west to Texas and Louisiana. ksacta Woods and thickets, especially along river banks[229].

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

nwatta Landscape Uses: Border, Specimen. An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. The flowers have a perfume of violets[245]. A short-lived tree in the wild[229]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: North American native, Fragrant flowers, Attractive flowers or blooms.

4.2.168 *Malus x astracanica*

3 tlin 7 cyuc 2 kcaok 0 tcan 0 dwat 5 m hkuc
hmmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Malus x astracanica* is a deciduous Tree growing to 5 m (16ft 5in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[105].

nrakta A garden hybrid, *M. prunifolia* x *M. pumila*[177]. ksacta Not known in the wild.

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

nwatta An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Prefers a sunny

position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. This hybrid species is possibly a primitive form of the cultivated apple[11]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.169 *Malus ioensis*

Prairie Crab, Prairie crab apple, Texas crab apple, Prairie Crabapple

3 tlin 8 cyuc 2 kcaok 2 tcan 0 dwat 5 m hkuc
hmmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik-
hpa7tmwatli xre7t hjonli

drutta *Malus ioensis* is a deciduous Tree growing to 5 m (16ft) by 5 m (16ft) at a slow 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 June, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[105, 159, 183, 257]. Up to 4cm in diameter[229]. Harsh and astringent[1, 227, K], it is best baked or made into preserves. It makes excellent jellies and cider[229].

tcanta WoodWood - heavy. Of no commercial importance[229]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

nrakta Central N. America - Indiana to Minnesota, south to Texas and Louisiana. ksacta Open woods, thickets, pastures, along streams etc, with a preference for calcareous soils[228].

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

nwatta Landscape Uses: Border, Specimen. An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils. Dislikes chalky soils, this is especially true for the cultivar 'Plena'[200]. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[200]. A slow-growing and short-lived species in the wild[229], it produces suckers from the roots and often forms thickets[228]. This species is closely related to *M. coronaria*[1]. It hybridizes freely with other members of the genus[200]. There are many named forms, selected for their ornamental value[200]. The fruit is a good wildlife food source, especially for birds[200]. The plant fruits very heavily in southern Britain[K]. Plants in this genus are notably susceptible to honey fungus[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 a standard with a non-suckering single trunk [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2].

4.2.170 *Zanthoxylum americanum*

Prickly Ash - Northern, Common pricklyash, Northern Prickly Ash

3 tlin 7 cyuc 2 kcak 2 tcan 3 dwat 4 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatpriklwis
hpa7tmwatli nyanhjen hjonli

drutta *Zanthoxylum americanum* is a deciduous Shrub growing to 4 m (13ft) by 4 m (13ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to June, and the seeds ripen from September to October. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). . The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Tannins may reduce gut iron absorption. Possible nervous system stimulation. Excessive ingestion may interfere with anticoagulant therapy [301].

kcakta Edible Parts: Edible Uses: CondimentSeed - cooked. It is used as a condiment. A pepper substitute[106]. The fruit is rather small, about 4 - 5m in diameter[229], but is produced in dense clusters which makes harvesting easy[K]. Each fruit contains a single seed[229].

tcanta EssentialAgroforestry Uses: The plant's prickly mature and suckering habit can produce an effective barrier[277]. Other Uses: The fruits have been used by young men as a perfume[257]. Wood - soft. It weighs 35lb per cubic foot[235]. Of little use[229].

dwatta Anodyne Antirheumatic Antispasmodic Carminative Diaphoretic Diuretic Dysentery Irritant Odontalgic Sialagogue Skin StimulantPrickly ash is a warming, stimulating herb that is beneficial for the circulation. It was highly regarded by the native North American Indians who used it especially to alleviate rheumatism and toothache[254]. All parts of the plant, but especially the bark and roots, contain the aromatic bitter oil xanthoxylin[229]. This has a number of applications in medicine, especially in the treatment of arthritic and rheumatic conditions, digestive problems and leg ulcers[229, 254]. The fruit has a similar medicinal action to the bark[4]. The bark and roots are irritant, odontalgic and antirheumatic[213]. Along with the fruit they are diaphoretic, stimulant and a useful tonic in debilitated conditions of the stomach and digestive organs[4]. They produce arterial excitement and are of use in the treatment of fevers, ague, poor circulation etc[4]. The fruits are considered more active than the bark, they are also antispasmodic, carminative, diuretic and antirheumatic[4, 213, 222]. The pulverized root and bark are used to ease the pain of toothache[213, 222]. One report says that it is very efficacious, but the sensation of the acrid bark is fully as unpleasant as the toothache[213]. Chewing the bark induces copious salivation[222]. Rubbing the fruit against the skin, especially on the lips or in the mouth, produces a numbing effect[K]. A tea or tincture of the bark has been used in the treatment of rheumatism, dyspepsia, dysentery, heart and kidney troubles etc[222]. A tea made from the inner bark has been used to treat itchy skin[213, 257].

nrakta Eastern N. America - Quebec to Florida, west to Minnesota and Oklahoma. ksacta Found on upland rocky hillsides and on moist low-lying sites, in open woods, on bluffs or in thickets[229].

propta Seed - best sown in a greenhouse as soon as it is ripe in the autumn. Stored seed may requires up to 3 months cold stratification, though scarification may also help[113]. Sow stored seed in a cold frame as early in the year as possible. Germination should take place in late spring, though it might take another 12 months. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter. Plant them out in early summer. Cuttings of half-ripe wood, July/August in a frame. Root cuttings, 3cm long, planted horizontally in pots in a greenhouse. Good percentage[78]. Suckers, re-

moved in late winter and planted into their permanent positions[113].

nwatta Landscape Uses:Border, Massing. Prefers a good deep well-drained moisture retentive soil in full sun or semi-shade[1, 11, 200]. A relatively fast-growing plant in the wild, it often forms thickets by means of root suckers[229]. All parts of the plant are fragrant. The bruised foliage has a delicious resinous orange-like perfume[245]. Dioecious. Male and female plants must be grown if seed is required. Flowers are formed on the old wood[206]. Special Features:North American native, Attracts butterflies, Inconspicuous flowers or blooms, Blooms appear periodically throughout the year. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.171 *Cotoneaster racemiflorus*

Black-Wood, Cotoneaster

3 tlin 7 cyuc 2 kcak 2 tcan 1 dwat 2.4 m hkuc
hmimhtut cyutli kyuctcup hwicli hyishrasjlutnyikfrip hpa7tli
flatpriklwisslip hpa7tmwatli hre7t hjonli

drutta *Cotoneaster racemiflorus* is a deciduous Shrub growing to 2.4 m (7ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Flies, midges. 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 alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: MannaEdible Uses: Yields a manna-like substance called shir-khist, it is rich in sugars[46, 61, 183]. It contains about 13% sacchrose, 37.5% dextrose[105, 183]. No details of which part of the plant yields the manna, it is most likely to be the stem.

tcanta Basketry Dye WoodA rose-tan dye is obtained from the fruit[168]. The wood is used in basket making.

dwatta Aperient Expectorant StomachicThe plant is aperient, expectorant and stomachic[240].

nrakta N. Africa to W. and C. Asia. ksacta Shrubby thickets on stony slopes[74]. To elevations of 2400 metres in Kashmir[145].

propta Seed. Members of this genus hybridize freely so, if you require seed that breeds true, it is important to obtain it from a known wild source or from a controlled fertilization of garden plants. The seed is best sown as soon as it is ripe in the autumn in a cold frame, when it will usually germinate in the spring[11, 200]. Stored seed germinates faster if given 3 months warm stratification at 15°C and then 3 months cold stratification at 4°C[164]. The seed usually germinates within 1 - 18 months at 15°C but it can take 2 years[164]. Pot the seedlings up as soon as they are large enough to handle and plant them out into nursery beds or into their permanent positions when they are more than 10cm tall. Cuttings of half-ripe wood with a heel, July/August in a frame[11, 200]. Cuttings of mature wood of the current year's growth, preferably with a heel, November in a frame.

nwatta An easily grown plant, it prefers a good soil but also does well in poor soils[1, 11, 200]. It thrives in lime and is also happy in peaty soils[1]. It succeeds in any soil that is not marshy or waterlogged[11, 200]. Succeeds in dry soils[188]. Grows well in heavy clay soils. Succeeds in full sun or semi-shade but does not fruit so freely in a shady position[11, 200]. Tolerates atmospheric pollution[200]. A very hardy plant, tolerating temperatures down to about -25°C[200]. Hybridizes freely with other members of this genus[200]. There are several sub-species[200]. The flowers, when inhaled near to, have an unpleasant smell like decaying fish[245]. They are very attractive to bees whilst the fruit is a good winter food source for many species of birds[200]. Trees are notably susceptible to honey fungus[200]. In garden design, as well as the above-ground ar-

structure of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.2.172 *Aruncus dioicus*

Goat's Beard, Bride's feathers

3 tlin 7 cyuc 2 kcaak 0 tcan 2 dwat 2 m hkuc
hmimhtut cyutli kyucuphja7n hwicli hrasjlutnyik hpa7tli
frusflatprikhwisslip hpa7tmwatli nyanhjen hjonli

drutta *Aruncus dioicus* is a PERENNIAL growing to 2 m (6ft) by 3 m (9ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 7. It is in flower from June to August. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by 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 and can grow in very acid and very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry moist or wet soil.

pcista Cyanogenic glycosides are found in the leaves[74].

kcakta Edible Parts: LeavesEdible Uses: Budlings, stems and young leaves - cooked[177]. Some caution is advised, see the notes above on toxicity.

tcanta Plants form a dense growth that is very effective at holding invasive plants at bay[208]. They can be used as a tall ground cover for large areas[208].

dwatta Antipyretic Astringent Birthing aid Salve Stings Stomachic VDThe poulticed root is applied to bee stings[222, 257]. A tea made from the roots is used to allay bleeding after child birth, to reduce profuse urination and to treat stomach pains, diarrhoea, gonorrhoea, fevers and internal bleeding[222, 257]. The tea is used externally to bathe swollen feet and rheumatic joints[222, 257]. A salve made from the root ashes is rubbed onto sores[257].

nrakta Europe, N. America and Asia. ksacta Damp woods, shady places and by streams, usually in mountainous areas[50, 187].

propta Seed - best sown in a cold frame as soon as it is ripe. Sow stored seed in late winter or early spring in a cold frame. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame until they are at least 15cm tall. They can be planted out into their permanent positions at any time of the year. Division in early spring or autumn[200]. Very easy, the clumps can be planted out direct into their permanent positions.

nwatta Landscape Uses:Border, Massing, Seashore, Specimen, Woodland garden. Succeeds in most moist soils in sun or partial shade[187, 200, 233]. Plants do well in moist to wet soils but will also tolerate fairly dry sites[208]. Succeeds in acid or limey soils[208]. Grows well on the woodland edge[200]. Plants can be grown in quite coarse grass, which can be cut annually in the autumn[233]. Plants are hardy to at least -20°C[187]. This is a polymorphic species, especially the form that grows in Japan[187]. There are some named forms selected for their ornamental value, 'Kneiffii' is only half the size of the type species[208]. Plants are fast-growing[208] and form very large clumps[187]. The flowers are sweetly perfumed[245]. Dioecious, male and female plants must be grown if seed is required[208]. Special Features:Attractive foliage, Naturalizing, Wetlands plant.

4.2.173 *Eleutherococcus senticosus*

Siberian Ginseng

3 tlin 7 cyuc 2 kcaak 0 tcan 5 dwat 2 m hkuc
hmimhtut cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprikhwisslip hpa7tmwatli xre7t hjonli

drutta *Eleutherococcus senticosus* is a deciduous Shrub growing to 2 m (6ft 7in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and

basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It can tolerate atmospheric pollution.

pcista Caution if high blood pressure. Avoid coffee. 6 weeks maximum use. Avoid during pregnancy. Unsuitable for children. High doses may cause drowsiness, anxiety, irritability, mastalgia and uterine bleeding. Possible blood pressure increases and irregular heart beats. Effects of anti-diabetic drugs, sedatives and anticoagulants may be potentiated [301]

kcakta Edible Parts: LeavesEdible Uses: TeaYoung leaves and buds - cooked[105, 177]. The dried leaves are used as a tea substitute[105, 177].

dwatta Adaptogen Antiinflammatory Hypoglycaemic Tonic VasodilatorSiberian ginseng is a powerful tonic herb with an impressive range of health benefits. Unlike many herbs with a medicinal use, it is more useful for maintaining good health rather than treating ill health. Research has shown that it stimulates resistance to stress and so it is now widely used as a tonic in times of stress and pressure[254]. This plant is a very commonly used folk treatment in China and Russia where it is used as a ginseng substitute[218]. It is a pungent bitter-sweet warming herb that is said to be stronger in its action than ginseng[238]. Regular use is said to restore vigour, improve the memory and increase longevity[218]. The root and the root bark are adaptogen, anti-inflammatory, hypoglycaemic, tonic and vasodilator. It is taken internally during convalescence and in the treatment of menopausal problems, geriatric debility, physical and mental stress etc[238]. It works by strengthening the bodies natural immune system[140, 165, 176, 238]. It has also been used to combat radiation sickness and exposure to toxic chemicals[200, 218, 238]. This herb is not prescribed for children, and should not be used for more than 3 weeks at one time[238]. Caffeine should not be taken when using this herb[238]. The roots are harvested in the autumn and dried for later use[238]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Eleutherococcus senticosus* for tendency to infection, lack of stamina (see [302] for critics of commission E).

nrakta E. Asia - China, Japan, Siberia. ksacta Mixed and coniferous mountain forests, forming small undergrowth or groups in thickets and edges. Sometimes found in oak groves at the foot of cliffs, very rarely in high forest riparian woodland[74].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame[200]. It can be slow to germinate. Stored seed requires 6 months warm followed by 3 months cold stratification[113] and can be very slow to germinate[133]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in a cold frame or greenhouse for at least the first winter. Plant out in late spring or early summer. Cuttings of half-ripe wood, July/August in a frame[113, 200]. Cuttings of ripe wood of the current season's growth, 15 - 30cm long in a cold frame[238]. Root cuttings in late winter[200]. Division of suckers in the dormant season[200].

nwatta Prefers a light warm open loamy humus-rich soil and a position sheltered from north and east winds[11, 200]. Prefers a well-drained soil and full sun[200]. (A surprising report, this species is a woodland plant and we would expect it to prefer shade[K]) Tolerates urban pollution and poor soils[200]. Plants are hardy to at least -15°C if they are sheltered from cold winds[200]. A highly polymorphic species[74]. Siberian ginseng is cultivated as a medicinal plant in Russia and China[140].

4.2.174 *Amelasorbus jackii*

Jack's amelasorbus

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat 2 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwisslip hpa7tmwatli xre7t hjonli

drutta *Amelasorbus jackii* is a deciduous Shrub growing to 2 m (6ft 7in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light

woodland) or no shade. It prefers moist soil.
kcka Edible Parts: Fruit Edible Uses: Fruit - raw or cooked. Not very palatable[183].

nrakta Western N. America - Idaho and Oregon. ksacta Not known

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame. If stored seed is obtained early enough in the autumn, it can be given 4 weeks warm stratification before being left out in the winter and it should then germinate in the spring. Otherwise seed can be very slow to germinate, perhaps taking 18 months or more. When large enough to handle, prick the seedlings out into individual pots and grow them on in a sheltered outdoor position, planting them out once they are 20cm or more tall. This is a bi-generic hybrid and, if seed is produced, it is unlikely to breed true. If there is sufficient seed it is best to sow it thinly in an outdoor seedbed[78, 80]. Grow the seedlings on for two years in the seedbed before planting them out into their permanent positions during the winter. Layering in spring - takes 18 months[78]. Division of suckers in late winter. The suckers need to have been growing for 2 years before you dig them up, otherwise they will not have formed roots. They can be planted out straight into their permanent positions if required.

nwatta Prefers a sunny position in a well-drained moisture-retentive humus-rich lime-free soil[200]. This species probably tolerates some lime in the soil[200]. Succeeds in semi-shade though it fruits less well in such a position[200]. Hardy to about -20°C[200]. Plants are surprisingly vigorous in British gardens[11]. A naturally occurring bi-generic hybrid, *Amelanchier alnifolia* semi-integrifolia x *Sorbus scopulina*, it is very variable in the wild[182, 200].

4.2.175 *Grindelia squarrosa*

Rosin Weed, Curlycup gumweed
3 tlin 7 cyuc 2 kcaak 0 tcan 3 dwat 1 m hkuc
htut cyutli hgatkuyuctcup hwicli hyhshrasjlut hpa7tli flatprikliw hpa7tmwatli xre7t hjonli

drutta *Grindelia squarrosa* is a BIENNIAL/PERENNIAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by insects. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista The plant contains the carcinogen safrole[274].
kcka Edible Parts: Edible Uses: Gum Tea The fresh or dried leaves can be used to make an aromatic, slightly bitter but pleasing tea[183]. A sticky resinous sap that covers the leaves can be used as a chewing gum substitute[183].

tcanta Dye Gum Yellow and green dyes are obtained from the flowering heads and pods[168]. Aromatic.

dwatta Antispasmodic Eczema Expectant Homeopathy Poulitice Sedative Rosin weed was used by the native North American Indians to treat bronchial problems and also skin afflictions such as reactions to poison ivy[254]. It is still used in modern herbalism where it is valued especially as a treatment for bronchial asthma and for states where phlegm in the airways impedes respiration[254]. In addition, it is believed to desensitize the nerve endings in the bronchial tree and slow the heart rate, thus leading to easier breathing[254]. The plant merits investigation as a treatment for asthma[222]. The herb is contraindicated for patients with kidney or heart complaints[254]. The dried leaves and flowering tops are antiasthmatic, anti-inflammatory, antispasmodic, expectorant and sedative[4, 46, 207, 212, 238, 254]. The principal use of this herb is in the treatment of bronchial catarrh, especially when there is an asthmatic tendency, it is also used to treat whooping cough and cystitis[4, 254]. The active principle is excreted from the kidneys, and this sometimes produces signs of renal irritation[4, 238]. Externally, the plant is used as a poultice to treat burns, poison ivy rash, dermatitis, eczema and skin eruptions[212, 213, 222, 238]. The plant is harvested when in full bloom and can be used fresh as a poultice or dried for infusions etc[254]. A fluid extract is prepared by placing the freshly gathered

leaves and flowers in a small quantity of simmering water for about 15 minutes[213]. A homeopathic remedy is prepared from the leaves and flowering stems[4].

nrakta N. America - Minnesota to British Columbia, south to California and Texas. ksacta Prairies, plains and dry banks[4, 43].

propta Seed - sow autumn or spring in a cool greenhouse and only just cover the seed. Prick out the plants into individual pots when they are large enough to handle and plant them out into their permanent positions in early summer. Division as new growth commences in the spring. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring. Cuttings.

nwatta Industrial Crop: Hydrocarbon Management: Hay Wild Crop Succeeds in any well-drained soil in full sun[200]. Does well on dry sandy banks and in poor soils[200]. Prefers a peaty loam soil[1]. This is one of the first species to invade disturbed or denuded ground and often becomes a serious weed of grazing land[212]. A very polymorphic plant[43].

4.2.176 *Aquilegia vulgaris*

Columbine, European columbine, Granny's Bonnet, European Crowfoot

3 tlin 9 cyuc 2 kcaak 0 tcan 1 dwat 1 m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli flatprikliw hpa7tmwatli xre7t hjonli

drutta *Aquilegia vulgaris* is a PERENNIAL growing to 1 m (3ft 3in) by 0.5 m (1ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from April to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista The plant is poisonous though the toxins are destroyed by heat or by drying[7, 19]. Although this plant contains alkaloids, no cases of poisoning to humans or other mammals have been recorded[76].

kcka Edible Parts: Flowers Edible Uses: Tea Flowers - raw. Rich in nectar, they are sweet and delightful[172], they make a very attractive addition to mixed salads and can also be used as a thirst-quenching munch in the garden[K]. The flowers are also used as a tea substitute[177].

tcanta Parasiticide Parasiticide The seed is used as a parasiticide to rid the hair of lice[172]. The dried and crushed seed is used to kill external body parasites[53].

dwatta Antianxiety Astringent Depurative Diaphoretic Diuretic Homeopathy Parasiticide Parasiticide Columbine was formerly employed in herbal medicine mainly for its antiscorbic effect, but it has fallen out of favour and is little used nowadays[268]. The leaves root and seed are astringent, depurative, diaphoretic, diuretic, parasiticide[4, 7, 9, 19, 21]. Because of its toxic properties, this plant should not be taken internally without expert advice, though the root is sometimes used externally in poultices to treat ulcers and the commoner skin diseases[7, 268]. The plant can be harvested at any time from June to October[7]. Columbine has produced very unsatisfactory results and is not normally used medicinally[4]. A homeopathic remedy is made from the plant[7]. It is used in the treatment of affections of the nervous system[7].

nrakta Central and southern Europe, including Britain, south and east to N. Africa and Temperate China. ksacta Moist shady positions, especially on calcareous soils or fenland peat[7, 17, 31].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be slow to germinate[200]. Stored seed can be sown in late winter in a cold frame. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for their first winter. Plant out in late spring or early summer. Division in spring[200].

nwatta Landscape Uses: Border, Rock garden, Woodland garden. Succeeds in ordinary garden soil, preferring a moist but not wet soil and a sunny position[1]. Thrives in partial shade[1, 111]. Intolerant of heavy clay[200]. Plants

are hardy to at least -25°C[187]. Whilst the blue-flowered forms of this species have no scent, white flowered forms have a soft clove scent in order to attract pollinating insects[245]. Most species are short-lived, dying out after 2 - 3 years, though they usually produce seed prolifically[200]. This species usually self-sows freely in the garden, it is very apt to hybridize with other members of the genus and usually becomes the dominant partner in any hybridization[200]. Plants seem to be immune to the predations of rabbits[233]. A greedy plant, inhibiting the growth of nearby plants, especially legumes[54, 201]. It also attracts red spider mites to the garden, these can then move on to other crops such as apples, pears and strawberries[201]. It grows well with rhubarb[201]. Special Features: Attracts birds, Not North American native, Naturalizing, All or parts of this plant are poisonous, Suitable for cut flowers. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fibrous dividing into a large number of fine roots [2-1].

4.2.177 *Anchusa azurea*

Anchusa, Italian bugloss
3 tlin 7 cyuc 2 kcaak 0 tcan 1 dwat 1.5 m hkuc
htut cyuti hgactop hwicli hrasjlutnykrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Anchusa azurea* is a PERENNIAL growing to 1.5 m (5ft) by 0.6 m (2ft in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought.

kcakta Edible Parts: Flowers Leaves Edible Uses: Flowers - raw. An excellent and decorative addition to the salad bowl, or used as a garnish[183]. The tender young leaves and young flowering shoots can be cooked and eaten as a vegetable[7].

tcanta Dye A red dye is obtained from the root[7]. This was at one time used as a basis for some cosmetics[7].

dwatta Antitussive Depurative Diaphoretic Diuretic Poultice The whole plant is antitussive, depurative, diaphoretic and diuretic[7]. It is harvested when in flower and dried for later use. The dried and powdered herb is used as a poultice to treat inflammations[7]. Use internally with caution, the plant contains the alkaloid cynoglossine which can have a paralyzing effect[7].

nrakta Europe - Caucasus. An occasional garden escape in Britain[17]. ksacta Sides of arable fields, waste places, roadsides and steppes on stony hills[45, 187].

propta Seed - sow spring in pots of sandy soil[200]. An overnight drop in temperature helps germination[133]. The seed usually germinates in 1 - 4 weeks at 21°C[133]. When large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. Division in early spring[200]. Root cuttings in autumn or early winter. Late winter is best[200].

nwatta Succeeds in most soils, preferring a sunny position[1, 111]. Prefers a fertile well-drained soil[111]. Tolerates heavy clay[200]. Requires a deep well-drained soil[187]. Established plants tolerate drought[187]. Plants are hardy to about -15°C[187]. The flowers are a good source of food for bees[1]. Many named forms have been selected for their ornamental value[187]. The plants tend to be short-lived perennials but they can be propagated by means of root cuttings[187].

4.2.178 *Polygonatum pubescens*

Hairy Solomon's Seal
3 tlin 7 cyuc 2 kcaak 0 tcan 1 dwat 1 m hkuc
pcimhmit cyuti tcup hwicli hrasjlutnyik hpa7tli flatprik-
wis hpa7tmwatli fyfibre7t hjonli

drutta *Polygonatum pubescens* is a PERENNIAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to June. 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 full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

pcista Although no reports of toxicity have been seen for this species, some members of this genus have poisonous fruits and seeds.

kcakta Edible Parts: Leaves Root Edible Uses: Young shoots - cooked[102]. They can be used as an asparagus substitute. Root - cooked[102]. The root is up to 18mm thick[270]. It is rich in starch.

dwatta Haemostatic Ophthalmic A decoction of the plant has been used in the treatment of spitting up of blood[257]. An infusion of the roots has been used as an eye wash in the treatment of snow blindness[257].

nrakta Eastern to Central N. America - Nova Scotia, Manitoba and southwards. ksacta Rich shady woods[43]. Rich moist wooded slopes and coves from sea level to 1100 metres[270].

propta Seed - best sown as soon as it is ripe in early autumn in a shady part of a cold greenhouse[200]. Sow stored seed as early in the year as possible. Germination can be slow, they may not come true to type[200] and it takes a few years for them to reach a good size. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in a shady 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. Division in March or October. 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 fertile humus rich moisture-retentive well-drained soil in cool shade or semi-shade[200]. Plants are intolerant of heat and drought but they tolerate most other conditions[200]. This species is closely related to *P. odoratum*[200]. Members of this genus are rarely if ever troubled by browsing deer or rabbits[233]. The young shoots of most members of this genus are very attractive to slugs[K]. Hybridizes with other members of this genus[200].

4.2.179 *Bupleurum chinense*

Bei Chai Hu
3 tlin 7 cyuc 2 kcaak 0 tcan 3 dwat 1 m hkuc
hmimhtut cyuti kyuctcup hwicli hrasjlutnyik hpa7tli flat-
prikwis hpa7tmwatli fyfibre7t hjonli

drutta *Bupleurum chinense* 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 3. It is in flower from July to October, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Leaves Root Edible Uses: Rutin - Leaves and young shoots - cooked[2, 105, 177]. The new growth in spring and autumn is used[178, 179]. It is a good source of rutin[179]. Root - cooked. A famine food, used when all else fails[177, 179].

tcanta Fuel The old plant is used as a fuel[178, 179].

dwatta Alternative Analgesic Antibacterial Antiinflammatory Antiperiodic Antipyretic Antiviral Carminative Diaphoretic Emmenagogue Haemolytic Malaria Pectoral Sedative Bei chai hu root has been used in traditional Chinese medicine for at least 2,000 years[238]. It is a bitter herb that is used to harmonize the body, balancing the different organs and energies within the body[254]. It strengthens the digestive tract, acts as a tonic for the liver and circulatory system, lowers fevers and has anti-viral effects[238]. The root is alterative, analgesic, antibacterial, anti-inflammatory,

antipireptic, antipyretic, antiviral, carminative, diaphoretic, emmenagogue, haemolytic, hepatic, pectoral, sedative[116, 147, 174, 176, 178, 218, 238, 254]. It is taken internally in the treatment of malaria, blackwater fever, uterine and rectal prolapse, haemorrhoids, sluggish liver, menstrual disorders, abdominal bloating etc[238]. The roots are harvested in the autumn and can be used fresh or dried[238]. The root contains saikosides[254]. These saponin-like substances have been shown to protect the liver from toxicity whilst also strengthening its function, even in people with immune system disorders[254]. These saikosides also stimulate the body's production of corticosteroids and increase their anti-inflammatory affect[254]. The plant is often used in preparations with other herbs to treat the side effects of steroids[218].

nrakta E. Asia - China, Korea. ksacta Grassy areas on hills and mountain slopes in Korea[279]. Grasslands, stream banks, sunny slopes and roadsides at elevations of 100 - 2700 metres in China[266].

propta Seed - sow spring in a cold frame. The seed usually germinates in 2 - 8 weeks at 15°C[138]. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer or following spring. Division in spring. Very easy, larger clumps can be planted direct into their permanent positions. It is best to pot up smaller clumps and grow them on in a cold frame until they are well rooted before planting them out in the summer.

nwatta An easily cultivated plant[1], it succeeds in a sunny position in most fertile well-drained soils[138, 233, 238]. This species is closely related to *B. falcatum*, and is included in that species by some botanists.

4.2.180 *Urtica californica*

Stinging Nettle, California nettle

3 tlin 10 cyuc 2 kcak 4 tcan 2 dwat 1.8 m hkuc hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis hpa7tmwatli nyanhjen hjonli

drutta *Urtica californica* is a PERENNIAL growing to 1.8 m (6ft). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. 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.

pcista The leaves of the plants have stinging hairs, causing irritation to the skin[21, 200]. This action is neutralized by heat so the cooked leaves are perfectly safe and nutritious[200]. However, only young leaves should be used because older leaves develop gritty particles called cystoliths which act as an irritant to the kidneys[172].

kcakta Edible Parts: Leaves Edible Uses: Drink Young leaves - cooked[172]. A very nutritious food, high in vitamins and minerals, it makes an excellent spinach substitute and can also be added to soups and stews. Only use the young leaves and wear stout gloves when harvesting them to prevent getting stung. Although the fresh leaves have stinging hairs, thoroughly drying or cooking them destroys these hairs. Nettle beer is brewed from the young shoots[200].

tcanta Compost Dye Fibre Hair Liquid feed Repellent A strong flax-like fibre is obtained from the stems[200]. Used for making string and cloth, it also makes a good quality paper[115]. It is harvested as the plant begins to die down in early autumn and is retted before the fibres are extracted[4, 99]. The following uses have been listed for *U. dioica*, but they are almost certainly also applicable to this species. The plant matter left over after the fibres have been extracted are a good source of biomass and have been used in the manufacture of sugar, starch, protein and ethyl alcohol[4]. An oil obtained from the seeds is used as an illuminant[4]. An essential ingredient of 'QR' herbal compost activator[32]. This is a dried and powdered mixture of several herbs that can be added to a compost heap in order to speed up bacterial activity and thus shorten the time needed to make the compost[K]. The leaves are also an excellent addition to the compost heap[12, 18, 20] and they can be soaked for 7 - 21 days in water to make a very nutritious liquid feed for plants[54].

This liquid feed is both insect repellent and a good foliar feed[14, 18, 53]. The growing plant increases the essential oil content of other nearby plants, thus making them more resistant to insect pests[18, 20, 54]. Although many different species of insects feed on nettles, flies are repelled by the plant so a bunch of freshly cut stems has been used as a repellent in food cupboards[4]. The juice of the plant, or a decoction formed by boiling the herb in a strong solution of salt, will curdle milks and thus acts as a rennet substitute[4]. This same juice, if rubbed into small seams of leaky wooden tubs, will coagulate and make the tub watertight again[4]. A hair wash is made from the infused leaves and this is used as a tonic and antidandruff treatment[172, 201]. A beautiful and permanent green dye is obtained from a decoction of the leaves and stems[4, 115]. A yellow dye is obtained from the root when boiled with alum[4, 115].

dwatta Antirheumatic The fresh leaves of nettles have been rubbed or beaten onto the skin in the treatment of rheumatism etc[K]. This practice, called urtification, causes intense irritation to the skin as it is stung by the nettles. It is believed that this treatment works in two ways. Firstly, it acts as a counter-irritant, bringing more blood to the area to help remove the toxins that cause rheumatism. Secondly, the formic acid from the nettles is believed to have a beneficial effect upon the rheumatic joints.

nrakta South-western N. America - California. ksacta Wet brushy thickets along the immediate coast[71].

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

nwatta We have very little information on this species and do not know if it will be hardy in Britain, though judging by its native range it should succeed outdoors in most parts of the country. It is very closely related to *U. lyallii* and is doubtfully distinct from it[71]. The Flora of North America treats this taxon as no more than a synonym of *Urtica dioica gracilis*[270]. The following notes are based on the general needs of the genus. Prefers a nitrogen-rich soil[200]. The best fibre is produced when plants are grown on deep fertile soils[200]. Dioecious. Male and female plants must be grown if seed is required. Note: *Urtica californica* Greene is a synonym of *Urtica dioica* subsp. *gracilis* (Aiton) Selander For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.181 *Aralia hispida*

Bristly Sarsaparilla

3 tlin 7 cyuc 2 kcak 2 tcan 1 dwat 1 m hkuc hmimhtut cyutli kyuctcup hwicli hyishrasljutnyik hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Aralia hispida* is a deciduous Shrub growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, 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.

kcakta Edible Parts: Edible Uses: Drink Tea tea is made from the roots[183]. The roots are also used for making 'root beer'[183].

tcanta Wildlife shelter. Nectary shelter [1-2].

dwatta Alternative Cardiac Diaphoretic Diuretic Tonic A tea made from the leaves is diaphoretic[222]. The root is alternative and tonic[257]. An infusion of the root has been used in the treatment of heart diseases[257]. The bark, and especially the root bark, is diuretic and tonic[4, 222]. A homeopathic remedy is made from the fresh root[4]. It has alter-

diaphoretic and diuretic properties and is considered to be a good treatment for dropsy[4].

nrakta Eastern and Central N. America - E. Canada to Virginia, west to Illinois and Minnesota. ksakta Rocky or sandy sterile soils, Alberta to Saskatchewan, Manitoba and Quebec[204].

propta Seed - best sown as soon as ripe in a cold frame. Stored seed requires 3 - 5 months of cold stratification. Germination usually takes place within 1 - 4 months at 20°C[134]. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in a greenhouse for at least their first winter. Once the plants are 25cm or more tall, they can be planted out into their permanent positions, late spring or early summer being the best time to do this. Root cuttings 8cm long, December in a cold frame[11, 78]. Store the roots upside down in sand and pot up in March/April. High percentage[78]. Division of suckers in late winter[11]. Very easy, the suckers can be planted out direct into their permanent positions if required.

nwatta Prefers a moderately fertile deep moisture-retentive well-drained loam and a position in semi-shade but also succeeds in a sunny position[200]. Requires a sheltered position[200]. Plants are hardier when grown on poorer soils[200]. This species is especially tolerant of poor dry soils[200]. Prefers an acid soil[184]. Dormant plants are hardy to at least -15°C[184, 200]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. The whole plant has an unpleasant smell[4]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A clumping plant, forming a colony from shoots away from the crown but with a limited spread [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.182 *Dryopteris filix*

Male Fern

3 tlin 8 cyuc 2 kcaak 0 tcan 4 dwat 1.2 m hkuc
hmim cyutli hgatkyuctup hwicli hyishrasjlutnyik hpa7tli flat-prik hpa7tmwatli hjonli

drutta *Dryopteris filix-mas* is an evergreen Fern growing to 1.2 m (4ft) by 1 m (3ft 3in) at a medium rate. See above for USDA hardness. It is hardy to UK zone 2. It is in leaf all year, and the seeds ripen from July to September. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland). It prefers dry or moist soil and can tolerate drought.

pcista Although we have found no reports for this species, a number of ferns contain carcinogens so some caution is advisable[200]. The fresh plant contains thiaminase, an enzyme that robs the body of its vitamin B complex. In small quantities this enzyme will do no harm to people eating an adequate diet that is rich in vitamin B, though large quantities can cause severe health problems. The enzyme is destroyed by heat or thorough drying, so cooking the plant will remove the thiaminase[172]. However, there have been reports for other species of ferns suggesting that even cooked fronds can have a long term harmful effect. Some caution is therefore advised.

ckakta Edible Parts: Leaves Root Edible Uses: Young fronds - cooked[105, 177]. A flavour resembling asparagus, broccoli and artichokes[142]. Some caution is advised, see the notes above on toxicity. The rhizomes can be eaten raw or cooked[257]. They were eaten raw as part of a regime for losing weight[257].

tcanta Compost Potash Tannin A compost of fern leaves is very beneficial on tree seed beds, aiding germination[20]. The ashes of the plant are rich in potash and has been used in making soap and glass[4]. An effective ground cover plant. Although it is usually deciduous, its decaying fronds make a good weed-suppressing mulch in the winter[200]. Space the plants about 60cm apart each way[208]. The roots contain about 10% tannin[223].

dwatta Anodyne Antibacterial Anti-inflammatory Antirheumatic Antiviral Astringent Febrifuge Vermifuge Vulnerary The male fern is one of the most popular and effective treatments for tape worms. The root stalks are ano-

dyne, antibacterial, anti-inflammatory, antiviral, astringent, febrifuge, vermifuge and vulnerary[7, 9, 13, 19, 21, 171, 178, 218, 238]. The root contains an oleoresin that paralyzes tapeworms and other internal parasites and has been used as a worm expellent[222, 238]. The active ingredient in this oleoresin is 'filicin', roots of this species contain about 1.5 - 2.5% filicin[240]. It is one of the most effective treatments known for tapeworms - its use should be immediately followed by a non-oily purgative such as magnesium sulphate, *Convulvulus scammonia* or *Helleborus niger* in order to expel the worms from the body[7, 238, 254]. An oily purge, such as castor oil, increases the absorption of the fern root and can be dangerous[238]. The root is also taken internally in the treatment of internal haemorrhage, uterine bleeding, mumps and feverish illnesses[238]. The root is harvested in the autumn and can be dried for later use[7]. This remedy should be used with caution and only under the supervision of a qualified practitioner[21, 238]. The root is toxic and the dosage is critical[238]. Pregnant women and people with heart complaints should not be prescribed this plant[7]. See also notes above on toxicity. Externally, the root is used as a poultice in the treatment of abscesses, boils, carbuncles and sores[238, 268].

nrakta Throughout Europe, including Britain, and temperate Asia. ksakta Damp undergrowth, woodlands and other shady positions[7, 9, 31].

propta Spores - can be sown at any time of the year in a greenhouse. Surface sow on a sterilised compost and keep moist, possibly by placing the pot in a plastic bag. Germinates in 1 - 3 months at 20°C. Pot up small clumps of the plants when they are large enough to handle and grow on in a shady part of the greenhouse until large enough to plant out. Division in spring. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Landscape Uses: Border, Container, Ground cover, Massing, Rock garden, Specimen, Woodland garden. Prefers an acid to neutral soil, succeeding in ordinary fertile soil in a shady position[175, 200]. Succeeds in poor soils[208]. Succeeds in full sun but grows best in a shady position with only 2 - 3 hours sun per day[200]. Tolerates a pH range from 4.5 to 7[200]. Dislikes heavy clay[1]. Prefers a good supply of water at its roots[1] but succeeds in dry shade[28] and tolerates drought when it is established[200]. A very hardy plant, tolerating temperatures down to about -30°C[200], the plant remains evergreen in the milder areas of Britain[233]. Members of this genus are rarely if ever troubled by browsing deer[233]. An aggregate species[17]. There are many named forms, selected for their ornamental value[187]. Special Features: Attractive foliage, North American native, Wetlands plant, Attracts butterflies, There are no flowers or blooms.

4.2.183 *Artemisia vulgaris*

Mugwort, Common wormwood, Felon Herb, Chrysanthemum Weed, Wild Wormwood

3 tlin 9 cyuc 2 kcaak 1 tcan 3 dwat 1.2 m hkuc
hmimhtut cyutli hgatkyuctup hwicli hrasjlutnyik hpa7tli flat-prik lwisslip hpa7tmwatli xre7t hjonli

drutta *Artemisia vulgaris* is a PERENNIAL growing to 1.2 m (4ft) by 0.7 m (2ft 4in) at a fast rate. See above for USDA hardness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought.

pcista The plant might be poisonous in large doses[21]. Skin contact can cause dermatitis in some people[222]. Probably unsafe for pregnant women as it may stimulate the uterus to contract and induce abortion[301].

ckakta Edible Parts: Leaves Edible Uses: Colouring Condiment Leaves - raw or cooked[2, 9, 12, 27, 177]. Aromatic and somewhat bitter[244]. Their addition to the diet aids the digestion and so they are often used in small quantities as a flavouring, especially with fatty foods[183, 244].

They are also used to give colour and flavour to glutinous-rice dumplings (Mochi)[183, 244]. The young shoots are used in spring[46]. In Japan the young leaves are used as a potherb[183]. The dried leaves and flowering tops are steeped into tea[183]. They have also been used as a flavouring in beer, though fell into virtual disuse once hops came into favour[4].

tcanta Insecticide Repellent TinderThe fresh or the dried plant repels insects, it can be used as a spray but caution is advised since it can also inhibit plant growth[20]. A weak tea made from the infused plant is a good all-purpose insecticide[201]. An essential oil from the plant kills insect larvae[218]. The down on the leaves makes a good tinder for starting fires[115]. A number of species of Lepidoptera (butterflies and moths) feed on the leaves and flowers.

dwatta Anticonvulsant Antidepressant Antiemetic Antiseptic Antispasmodic Appetizer Carminative Cholagogue Diaphoretic Digestive Diuretic Emmenagogue Expectorant Foot care Haemostatic Nervine Purgative Stimulant Tonic Women's complaintsMugwort has a long history of use in herbal medicine especially in matters connected to the digestive system, menstrual complaints and the treatment of worms[238]. It is slightly toxic, however, and should never be used by pregnant women, especially in their first trimester, since it can cause a miscarriage[7, 238]. Large, prolonged dosage can damage the nervous system[268]. All parts of the plant are anthelmintic, antiseptic, antispasmodic, carminative, cholagogue, diaphoretic, digestive, emmenagogue, expectorant, nervine, purgative, stimulant, slightly tonic and used in the treatment of women's complaints[4, 7, 13, 21, 147, 165, 178, 201]. The leaves are also said to be appetizer, diuretic, haemostatic and stomachic[176, 218, 222]. They can be used internally or externally[218]. An infusion of the leaves and flowering tops is used in the treatment of nervous and spasmodic affections, sterility, functional bleeding of the uterus, dysmenorrhoea, asthma and diseases of the brain[176, 243]. The leaves have an antibacterial action, inhibiting the growth of *Staphylococcus aureus*, *Bacillus typhi*, *B. dysenteriae*, streptococci, *E. coli*, *B. subtilis*, *Pseudomonas* etc[176]. The leaves are harvested in August and can be dried for later use[4]. The stem is also said to be antirheumatic, antispasmodic, and stomachic[218]. The roots are tonic and antispasmodic[243]. They are said to be one of the best stomachics[4]. They are harvested in the autumn and dried for later use[4]. The leaves, placed inside the shoes, are said to be soothing for sore feet[238]. The compressed dried leaves and stems are used in moxibustion[176, 178, 218, 222, 238]. Another report says that the down from the leaves is used[4].

nrakta Throughout most temperate regions of the northern hemisphere, including Britain. **ksacta** Common on hedgebanks and waysides, uncultivated and waste land[4, 7, 17].

propta Seed - surface sow from late winter to early summer in a greenhouse and do not allow the compost to dry out. When large enough to handle, prick out the seedlings into individual pots. If growth is sufficient, they can be planted out into their permanent positions in the summer, otherwise grow them on in a cold frame for their first winter and then plant them out in the spring. Division in spring or autumn. Basal cuttings in late spring. Harvest the young shoots when about 10 - 15cm long, pot up in a lightly shaded position in a greenhouse or cold frame and plant them out when well rooted. Very easy.

nwatta Landscape Uses:Border. Easily grown in a well-drained circumneutral or slightly alkaline loamy soil, preferring a sunny position and a moist soil[1, 14, 200]. Plants are longer lived, more hardy and more aromatic when they are grown in a poor dry soil[245]. Tolerates a pH in the range 4.8 to 8.2. Established plants are drought tolerant[200]. Mugwort is an aggressive and invasive plant[14], it inhibits the growth of nearby plants by means of root secretions[20, 201]. The sub-species *A. vulgaris parviflora*. Maxim. is the form that is eaten in China[179]. There are some named varieties[200]. 'White' is a taller plant than the type species, growing to 1.5 metres. It has a strong, rather resinous or "floral" taste similar to chrysanthemum leaves and is used in soups or fried as a side dish[183]. Members of this genus are rarely if ever troubled by browsing deer[233]. Special Features:Edible, Not North American native, Invasive, Attracts butterflies, Suitable for dried flowers, Fragrant flowers, Inconspicuous flowers or blooms.

4.2.184 Bupleurum falcatum

Thorow-Wax

3 tlin 7 cyuc 2 kcaok 0 tcan 2 dwat 1 m hkuc hmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flat-prikliwis hpa7tmwatli fyifxre7t hjonli

drutta *Bupleurum falcatum* 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 3. It is in flower from July to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: LeavesEdible Uses: RutinLeaves and young shoots - cooked[2, 105, 177].The new growth in spring and autumn is used[178, 179]. It is a good source of rutin[179].

tcanta FuelThe old plant is used as a fuel[178, 179].

dwatta Alternative Analgesic Antibacterial Antiinflammatory Antiperiodic Antipyretic Antiviral Carminative Diaphoretic Emmenagogue Haemolytic Hepatic Malaria Pectoral Poultice SedativeA paste of the plant is applied to boils[272]. The juice of the roots, mixed with the juice of *Centella asiatica*, is used in the treatment of liver diseases[272]. This species is closely related to *B. chinense* and quite possibly has the same uses. It is certainly worthy of some research. The uses of *B. chinense* are as follows:- Bei chai hu root has been used in traditional Chinese medicine for at least 2,000 years[238]. It is a bitter herb that is used to harmonize the body, balancing the different organs and energies within the body[254]. It strengthens the digestive tract, acts as a tonic for the liver and circulatory system, lowers fevers and has anti-viral effects[238]. The root is alternative, analgesic, antibacterial, anti-inflammatory, antiperiodic, antipyretic, antiviral, carminative, diaphoretic, emmenagogue, haemolytic, hepatic, pectoral, sedative[116, 147, 174, 176, 178, 218, 238, 254]. It is taken internally in the treatment of malaria, blackwater fever, uterine and rectal prolapse, haemorrhoids, sluggish liver, menstrual disorders, abdominal bloating etc[238]. The roots are harvested in the autumn and can be used fresh or dried[238]. The root contains saikosides[254]. These saponin-like substances have been shown to protect the liver from toxicity whilst also strengthening its function, even in people with immune system disorders[254]. These saikosides also stimulate the body's production of corticosteroids and increase their anti-inflammatory affect[254]. The plant is often used in preparations with other herbs to treat the side effects of steroids[218].

nrakta Scattered throughout Europe, including Britain, and Asia north to the subarctic, east to Japan. **ksacta** Waste places and hedgebanks[17].

propta Seed - sow spring in a cold frame. The seed usually germinates in 2 - 8 weeks at 15°C[138]. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer or following spring. Division in spring. Very easy, larger clumps can be planted direct into their permanent positions. It is best to pot up smaller clumps and grow them on in a cold frame until they are well rooted before planting them out in the summer.

nwatta An easily cultivated plant[1], it succeeds in a sunny position in most fertile well-drained soils[138, 233, 238].

4.2.185 Galium aparine

Goosegrass, Coachweed, Catchweed, Stickywilly
3 tlin 7 cyuc 2 kcaok 3 tcan 3 dwat 1.2 m hkuc pcmhmimhtut cyutli kyuctcup hwicli hrasjlutnyik hpa7tli flat-prikliwis hpa7tmwatli fyifxre7t hjonli

drutta *Galium aparine* is an ANNUAL growing to 1.2 m (4ft) by 3 m (9ft 10in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Flies, beetles. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can

grows in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers dry or moist soil.

psista The sap of the plant can cause contact dermatitis in sensitive people[222]. Can cause severe skin irritation [301].

kcakta Edible Parts: Leaves Edible Uses: Coffee Tea The tender young shoot tips - raw or cooked as a pot-herb [5, 7, 53, 55, 62, 172, 183]. A rather bitter flavour that some people find unpalatable [244], they are best used in the spring [178]. They make a useful addition to vegetable soups [7, 244]. It is said that using this plant as a vegetable has a slimming effect on the body [238]. The roasted seed is a coffee substitute [2, 53, 62]. One of the best substitutes, it merely needs to be dried and lightly roasted and has much the flavour of coffee [4, 115, 183]. A decoction of the whole dried plant gives a drink equal to tea [2, 4].

tcanta Cleanser Dye Filter Tinder A red dye is obtained from a decoction of the root [4, 7, 168]. When ingested it can dye the bones red [4]. The dried plant is used as a tincture [99]. The plant can be rubbed on the hands to remove pitch (tar) [99]. The stems are placed in a layer 8cm or more thick and then used as a sieve for filtering liquids [4, 115, 172].

dwatta Alterative Antiphlogistic Aperient Astringent Cancer Depurative Diaphoretic Diuretic Eczema Febrifuge Homeopathy Skin Tonic Vulnerary Goosegrass has a long history of domestic medicinal use and is also used widely by modern herbalists. A valuable diuretic, it is often taken to treat skin problems such as seborrhoea, eczema and psoriasis, and as a general detoxifying agent in serious illnesses such as cancer [254]. The whole plant, excluding the root, is alterative, antiphlogistic, aperient, astringent, depurative, diaphoretic, diuretic, febrifuge, tonic and vulnerary [4, 7, 9, 21, 165, 218, 222]. It is harvested in May and June as it comes into flower and can be used fresh or dried for later use [4, 238]. It is used both internally and externally in the treatment of a wide range of ailments, including as a poultice for wounds, ulcers and many other skin problems [4, 7, 244], and as a decoction for insomnia and cases where a strong diuretic is beneficial [4]. It has been shown of benefit in the treatment of glandular fever, ME, tonsillitis, hepatitis, cystitis etc [238]. The plant is often used as part of a spring tonic drink with other herbs [4]. A tea made from the plant has traditionally been used internally and externally in the treatment of cancer [4, 218, 222]. One report says that it is better to use a juice of the plant rather than a tea [254]. The effectiveness of this treatment has never been proved or disproved [7]. Both Asperuloside (a terpenoid) and Coumarin (a benzopyrone) occur in some species of Galium. Asperuloside can be converted into prostaglandins (hormone-like compounds that stimulate the uterus and affect blood vessels), making the genus of great interest to the pharmaceutical industry [238]. A homeopathic remedy has been made from the plant [7].

nrakta Europe, including Britain, from Scandinavia south and east to Spain, N. and W. Asia. ksacta Hedge rows and as a weed of cultivated land [7]. Moist and grassy places on most types of soil [17].

propta Seed - best sown in situ as soon as the seed is ripe in late summer [200]. The seed can also be sown in spring though it may be very slow to germinate [200]. Once established, this plant does not really need any help to reproduce itself.

nwatta Prefers a loose moist leafy soil in some shade [200]. Plants tolerate dry soils, but they quickly become scorched when growing in full sun [200]. They do not thrive in a hot climate [200]. Another report says that plants succeed in most soils in full sun or heavy shade. A scrambling plant, the stems and leaves are covered with little hooked bristles by which it can adhere to other plants and climb into them [4]. A good species to grow in the wild garden, it provides food for the larvae of many butterfly species [30].

4.2.186 *Rosa virginiana*

Virginia Rose

3 tlin 7 cyuc 2 kcak 0 tcen 1 dwat 1.5 m hkuc
hmmihtut cyutli kyuctup hwicli hrasjlutnyikfrip hpa 7tli flat-
priklyws hpa 7tmwatli xre 7t hjonli

drutta *Rosa virginiana* is a deciduous Shrub growing to 1.5 m (5ft) at a medium rate. See above for USDA hardi-

ness. It is hardy to UK zone 3. It is in flower from July to August, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

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

kcakta Edible Parts: Fruit Leaves Edible Uses: Fruit - raw or cooked [177]. The fruit is up to 15mm in diameter [200], but there is only a thin layer of flesh surrounding the many seeds [K]. Some care has to be taken when eating this fruit, see the notes above on known hazards. The buds are eaten by native Indians in N. America [161, 177, 183]. No further details are given, does this refer to the leaf or flower buds? The seed is a good source of vitamin E, it can be ground into a powder and mixed with flour or added to other foods as a supplement [102, 183]. Be sure to remove the seed hairs [102].

tcanta Hedge Hedge Soil stabilization Can be grown as a hedge, succeeding in windy positions [1, 11]. The suckering form of this species can be used to fix sand dunes [11]. It also makes a good ground cover [245].

dwatta Anthelmintic Cancer Haemostatic Ophthalmic A decoction of the roots has been used as a bath and to treat worms in children [257]. An infusion of the roots has been drunk and used as a wash in treating bleeding cuts on the feet [257]. An infusion of the roots has been used as a wash to treat sore eyes [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 Eastern N. America - Newfoundland to Ontario, south to Louisiana. A garden escape in Britain [17]. ksacta Damp to dry thickets, clearings, swamps and shores [43].

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

nwatta Succeeds in most soils, preferring one on the dryish side [11]. Grows well in heavy clay soils. Prefers a circum-neutral soil and a sunny position [11]. Dislikes water-logged soils. Does well in a windy position [11]. Grows well with alliums, parsley, mignonette and lupins [18, 20]. Garlic planted nearby can help protect the plant from disease and insect predation [18, 20]. Grows badly with boxwood [18]. The flowers are fragrant [245]. The form in cultivation in Britain is very invasive, forming thickets with its suckers, whilst the

wild form does not produce suckers[11]. Hybridizes freely with other members of this genus[80]. Plants in this genus are notably susceptible to honey fungus[200].

4.2.187 *Polygonatum sibiricum*

Huang Jing

3 tlin 7 cyuc 2 kcaok 0 tcan 2 dwat 1 m hkuc
pcimhmim cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliw
hpa7tmwatli fyifxre7t hjonli

drutta *Polygonatum sibiricum* is a PERENNIAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to June, and the seeds ripen from August to September. The species is thermaphrodite (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 full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

pcista Although no reports of toxicity have been seen for this species, some members of this genus have poisonous fruits and seeds.

kcakta Edible Parts: Leaves RootEdible Uses: Young shoots - cooked[105, 176]. They can be used as an asparagus substitute. Root - cooked[105, 176]. Rich in starch.

tcanta Insecticide MiscellanyThe plant has insecticidal properties[218].

dwatta Antibacterial Antifungal Antirheumatic Demulcent Lenitive Miscellany TonicThe root is antibacterial, antifungal, antirheumatic, antiseptic, demulcent, lenitive, tonic and vasodilator[176, 218]. Its use lowers the blood pressure and prevents atherosclerosis and fatty infiltration in the liver[176]. It is used in the treatment of dry coughs due to chronic bronchitis and pulmonary tuberculosis, fatigue and poor appetite[176].

nrakta E. Asia - N. China, Mongolia and Siberia. ksakta Woods and sandy places near the sea[74]. Forests, thickets and shaded slopes at elevations of 800 - 2800 metres in China[266].

propta Seed - best sown as soon as it is ripe in early autumn in a shady part of a cold greenhouse[200]. Sow stored seed as early in the year as possible. Germination can be slow, they may not come true to type[200] and it takes a few years for them to reach a good size. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in a shady 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. Division in March or October. 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 fertile humus rich moisture retentive well-drained soil in cool shade or semi-shade[200]. Plants are intolerant of heat and drought but tolerate most other conditions[200]. This species is closely related to *P. verticillatum*[200]. Members of this genus are rarely if ever troubled by browsing deer or rabbits[233]. The young shoots of most members of this genus are very attractive to slugs[K]. Plants adopt a semi-climbing habit, scrambling through small shrubs[187]. Hybridizes with other species in this genus.

4.2.188 *Equisetum hyemale*

Dutch Rush, Scouringrush horsetail, Horsetail, Scouring Rush, Rough Horsetail

3 tlin 11 cyuc 2 kcaok 3 tcan 2 dwat 1 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliw
hpa7tmwatli hjonli

drutta *Equisetum hyemale* is a PERENNIAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 5. The seeds ripen from July to August. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Large quantities of the plant can be toxic. This is because it contains the enzyme thiaminase[172], a substance that can rob the body of the vitamin B complex[65]. In small quantities this enzyme will do no harm to people eating an adequate diet that is rich in vitamin B, though large quantities can cause severe health problems. The enzyme is destroyed by heat or thorough drying, so cooking the plant will remove the thiaminase[172]. The plant also contains equisetinic acid - see the notes on medicinal uses for more information[213].

kcakta Edible Parts: Root StemEdible Uses: Strobil (the fertile shoots in spring) - cooked[177]. An asparagus substitute. Caution is advised, see the notes above on toxicity. Roots - dried and then cooked[257]. A source of starch[177]. Caution is advised, see the notes above on toxicity. A further report says that the peeled stems, base of the plant, root and tubers were eaten raw by the N. American Indians, the report went on to say that this may be inadvisable[85].

tcanta Dye Fungicide Liquid feed Musical Paper Parasiticide Polish Sandpaper ScourerThe stems are very rich in silica[4]. They are used for scouring and polishing metal[1, 4, 46, 61, 99] and as a fine sandpaper[54, 99]. The stems are first bleached by repeated wetting and drying in the sun[74]. They can also be used as a polish for wooden floors and furniture[46, 178]. The infused stem is an effective fungicide against mildew, mint rust and blackspot on roses[14]. It also makes a good liquid feed[54]. Used as a hair rinse it can eliminate fleas, lice and mites[213, 257]. A light pink dye is obtained from the stem[99]. The hollow stems have been used as whistles[257]. Another report says that the stem joints are pulled apart and used by children to produce a whistling sound[257].

dwatta Antibacterial Antiinflammatory Antispasmodic Appetizer Cancer Diaphoretic Diuretic Expectorant Febrifuge Hypotensive Parasiticide StypticHorsetails have an unusual chemistry compared to most other plants[238]. They are rich in silica, contain several alkaloids (including nicotine) and various minerals[238, 279]. The plant is anticancer, anti-inflammatory, antispasmodic, diaphoretic, diuretic, expectorant, febrifuge, haemostatic, hypotensive and styptic[147, 176, 218, 279]. It also has an appetite-stimulating effect[279]. The barren stems are used, they are most active when fresh but can also be dried and sometimes the ashes of the plant are used[4]. The plant is a useful diuretic when taken internally and is used in the treatment of kidney and bladder problems[4]. A decoction applied externally will stop the bleeding of wounds and promote healing[4]. The plant contains polyphenolic flavonoids with bactericidal activity[218].

nrakta Temperate regions of Europe, including Britain, N. America and Asia. ksakta Shady streambanks etc, to 5000 metres[17].

propta Spores - best collected as soon as they are ripe in the spring and surface-sown immediately on a sterile compost. Keep moist and pot up as soon as the plants are large enough to handle. Very difficult[200]. Division. The plants usually spread very freely when well sited and should not really need any assistance.

nwatta Landscape Uses:Container, Ground cover, Woodland garden. Prefers a moist soil with a pH between 6.5 and 7.5[200]. Plants are hardy to about -30°C[200]. The stems of this species were once exported to Britain in quantity from Holland so that they could be used as an abrasive for cleaning pots and pans[238]. Plants have a deep and penetrating root system and can be invasive. If grown in the garden they are best kept in bounds by planting them in a large container which can be sunk into the ground[200]. Special Features:North American native, Invasive, Naturalizing, Wetlands plant. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fleshy. Thick or swollen - fibrous or tap root [2-1].

4.2.189 *Cleome lutea*

Yellow Spiderflower, Jones spiderflower

3 tlin 8 cyuc 2 kcaok 0 tcan 1 dwat 1.2 m hkuc
htut cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikliw
hpa7tmwatli hre7t hjonli

drutta *Cleome lutea* is a ANNUAL growing to 1.2 m (4ft). See above for USDA hardiness. It is hardy to UK zone 4 and is

frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Leaves Seed Edible Uses: Young shoots - cooked[85]. Seed - ground into a meal and used as a flour[85].

tcanta Dye Yields a black dye[85]. No further details are given, but it is probably obtained by boiling down the whole plant[K].

dwatta Stings The plant has been used to treat ant bites[257].

nrakta Western N. America - Nebraska to Washington and Arizona. ksacta Sandy soils on desert plains to lower montane valleys, it is also found on sandy flatland[60].

propta Seed - surface sow or only lightly cover the seed in spring in a greenhouse[164]. The seed usually germinates in 5 - 14 days at 25°C[164]. When large enough to handle, prick the seedlings out into individual pots and plant them out in late spring. Day time temperatures below 20°C depress germination but a night time fall to 20° is necessary[164].

nwatta Prefers a light fertile soil in a warm dry sunny position with plenty of room to spread[1, 200]. A frost tender plant, it can be grown as a summer annual in Britain[200].

4.2.190 *Tanacetum vulgare*

Tansy, Common tansy, Golden Buttons, Curly Leaf Tansy

3 tlin 9 cyuc 2 kcaak 4 tcan 2 dwat 1 m hkuc

htut cyutli kyuctup hwicli hras|lutnyik hpa7tli flatprik|wis hpa7tmwatli fyf|kre7t hjonli

drutta *Tanacetum vulgare* is a PERENNIAL growing to 1 m (3ft 3in) by 1.5 m (5ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from August to September, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

pcista The plant is poisonous if large quantities are ingested[20, 21, 76]. There have been cases of death in N. America from drinking strong brews of the tea, presumably as an abortifacient[207].

kcakta Edible Parts: Flowers Leaves Edible Uses: Condiment Tea Young leaflets - raw or cooked[5, 7, 13, 52, 53]. They can be added in small quantities to salads[183]. The plant is also used as a flavouring, it is a substitute for nutmeg and cinnamon[12, 27, 37, 55, 115]. This plant is not recommended for internal use[200]. The flowers have a unique flavour and are eaten or used as a garnish[183]. A bitter, somewhat lemon-flavoured tea is made from the leaves and flowering stems[183].

tcanta Compost Dye Essential Insecticide Repellent Strewing A green dye is obtained from the young shoots[4, 115]. The leaves and flowers can also be used and a yellow can also be obtained[169]. The plant is used as a strewing herb in cellars, churches etc in order to repel insects[4, 14, 20, 61, 201, 238]. Both the growing and the dried plant are said to repel flies, ants and fleas, especially if they are mixed with elder leaves (*Sambucus* spp.)[4, 12, 14, 18, 200, 201].

The leaves and the flowering shoots contain 0.15% of an essential oil that contains camphor, borneol and thujone[7, 213]. Both the leaves and the oil and they have been used to kill fleas and lice[213]. Thujone is an effective insecticide, but it is highly toxic to mammals when taken in excess[238]. The plant is a good addition to the compost heap, being valued for its mineral content[200]. Attractive flowers. Attracts wildlife. Landscape Uses: Container. Dynamic accumulator.

dwatta Anthelmintic Antirheumatic Antispasmodic Appetizer Bitter Carminative Emmenagogue Poultrice Stimulant Tonic Tansy is a commonly grown domestic remedy, useful in treating a wide range of complaints, though it is little used in modern herbalism[4, 254]. Its main value is as a vermifuge to expel intestinal worms and, to a lesser degree, to help stimulate menstrual bleeding[254]. Tansy should be

used with caution, however, it is possibly unsafe for internal use, especially if you are pregnant[238]. The essential oil in the leaves is toxic and as little as ½ oz can kill an adult[21, 222]. The leaves and flowering tops are anthelmintic, antispasmodic, bitter, carminative, emmenagogue, stimulant and tonic[4, 7, 9, 21, 46, 165]. An infusion of the leaves or whole plant is used to treat menstrual irregularities and as an anthelmintic, especially for children[4, 213]. It is also valuable in treating hysteria, kidney weaknesses, stomach problems, fevers and also as an emmenagogue[4]. In larger doses the plant can procure an abortion, though these doses can be poisonous[213]. Externally, tansy is used as a poultice on swellings and some eruptive skin diseases[4]. It is also used externally to kill lice, fleas and scabies, though even external use of the plant carries the risk of toxicity[254]. The plant is harvested as it is coming into flower and is dried for later use[4]. The seeds are used as an anthelmintic[207].

nrakta Most of Europe, including Britain, to the Caucasus, Armenia and Siberia. ksacta A common plant of waste ground, hedgerows etc[17].

propta Seed - sow spring in a greenhouse. Only just cover the seed and do not allow the pot to dry out. Prick out the seedlings into individual pots once they are large enough to handle and plant out in the summer. Division is very simple at almost any time in the growing season, though spring is probably best. Larger divisions can be planted out direct into their permanent positions. We have found that it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame until they are growing away well. Plant them out in the summer or the following spring.

nwatta Succeeds in an ordinary garden soil[1]. Plants thrive in almost any soil[4]. Tansy is occasionally grown in the herb garden, though a site for growing this plant should be selected with care since it usually spreads very aggressively at the roots[4, 14]. There are some named varieties[238]. 'Fernleaf' is a more decorative compact form to about 75cm, it does not spread so quickly. A good plant to grow in the orchard, when grown under fruit trees, raspberries, roses etc it repels insects from them[201]. The flowering plant attracts hoverflies and butterflies. Special Features: Edible, Fragrant foliage, Not North American native, Invasive, Naturalizing, Suitable for cut flowers, Suitable for dried flowers, Fragrant flowers. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [2-1].

4.2.191 *Secale vavilovii*

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat 1.2 m hkuc

htut cyutli hgattcup hwicli hras|lutnyik hpa7tli flatprik|wis hpa7tmwatli xre7t hjonli

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

kcakta Edible Parts: Seed Edible Uses: Seed - cooked[105]. Used as a cereal for making bread, cakes, thickening soups and so on[K].

nrakta Europe - Armenia. ksacta Eroded volcanic slopes, dry gorges, irrigation ditches and as a weed of cultivated land in Turkey[93].

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

nwatta We have very little information on this species but it should succeed as an annual crop in Britain. It might be possible to sow it as an over-wintering annual. Succeeds in most soils but prefers a well-drained light soil in a sunny position[1].

4.2.192 Solidago odora

Sweet Goldenrod, Anise-scented goldenrod, Chapman's goldenrod

3 tlin 9 cyuc 2 kcaak 2 tcan 2 dwat 1.2 m hkuc
hmmimhtut cyutli kyuctpuc hwicli hyishrasjlutnyikfrip hpa7tli
flatprikliwis hpa7tmwatli xre7t hjonli

drutta *Solidago odora* is a PERENNIAL growing to 1.2 m (4ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It 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. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Leaves Seed Edible Uses: Condiment Tea Leaves - cooked [177]. Seed [177]. No more details are given but the seed is very small and fiddly to harvest [K]. An aromatic, anise-flavoured tea is made from the dried leaves and dried fully expanded flowers [21, 55, 95, 183]. The blossoms are used as a flavouring [102].

tcanta Dye Essential An anise-scented essential oil is obtained from the plant [61]. It is used medicinally [207] and in perfumery - especially for scented soaps [245]. Mustard, orange and brown dyes can be obtained from the whole plant [168].

dwatta Antiseptic Aperient Astringent Carminative Diaphoretic Diuretic Dysentery Febrifuge Stimulant Tonic Urinary An infusion of the dried powdered herb is antiseptic [168]. The leaves make a very pleasant-tasting tea that is mildly astringent, carminative, diaphoretic, diuretic, febrifuge and stimulant [21, 95, 207, 222, 257]. It is useful in the treatment of coughs and colds, dysentery and ulceration of the intestines [4, 257]. The essential oil has been used as a diuretic for infants, as a local application for headaches and for the treatment of flatulence and vomiting [4]. The flowers are aperient, astringent and tonic [4]. An infusion is beneficial in the treatment of gravel, urinary obstruction and simple dropsy [4]. The root can be chewed as a treatment for sore mouths [257].

nrakta Eastern N. America - New Hampshire to Florida, west to Texas and Oklahoma. ksacta Dry sterile soil or thin woodlands [43]. Woods and roadsides in Texas [274].

propta Seed - sow spring in a cold frame. Only just cover the seed and do not allow the compost to become dry. Prick out the seedlings into individual pots when they are large enough to handle, and grow them on for their first winter in pots. Plant them out into their permanent positions in spring or early summer. Division in spring or autumn. Larger divisions can be planted out direct into their permanent positions. We have found it best to pot up the smaller divisions and grow them on in a lightly shaded position in a cold frame, planting them out once they are well established in the summer.

nwatta Succeeds in any moderately fertile moisture retentive soil in sun or semi-shade [200]. Tolerant of very poor sandy soils [200]. Grows well in heavy clay soils. A rather greedy plant, it is apt to impoverish the soil [1]. The bruised leaves have a smell like a mixture of sassafras and aniseed [245]. The plant attracts various beneficial insects such as ladybirds, lacewings and hoverflies to the garden, these insects will help to control insect pests in the garden [201, 238]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

4.2.193 Heliopsis helianthoides

False sunflower, Oxeye sunflower

3 tlin 9 cyuc 2 kcaak 2 tcan 0 dwat 1.5 m hkuc
hmmimhtut cyutli hgatkyuctcup hwicli hrasjlutnyikfrip hpa7tli
flatprikliwis hpa7tmwatli hjonli

drutta *Heliopsis helianthoides* is a PERENNIAL growing to 1.5 m (5ft) by 1.2 m (4ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. The flowers

are pollinated by Bees, Insects, Birds. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought.

kcakta Edible Parts: Flowers Edible Uses: The flowers have a mild taste and can be used as a garnish or in a salad [318-1].

tcanta Soil stabilization Possibly used for erosion control due to the fibrous deep roots. Insectory: The nectar and pollen of the flowers attract their fair share of insects, including long-tongued bees, Halictine bees, bee flies, butterflies, *Chauliognathus pennsylvanicus* (Goldenrod Soldier Beetle), and other insects. Among the long-tongued bees, is the oligolege *Holcopasites heliopsis* (False Sunflower Bee). The caterpillars of *Papaipoma rigida* (Rigid Sunflower Borer Moth) sometimes bore through the stems [318-1]. Attracts birds and painted lady butterflies. Plant communities - Thickets Selected cultivars are shorter and attractive in a more formal garden. Smooth oxeye is considered one of the best hardy plants for a wildflower garden border [318-1].

dwatta Febrifuge Malaria Ox-eye has been used in medicinal drinks, for treatment of lung troubles. The leaves have been used in a strong tea to reduce fevers and loosen phlegm. Stems have been used to treat malaria [318-1].

nrakta Native to eastern and central North America from Saskatchewan east to Newfoundland and south as far as Texas, New Mexico, and Georgia. ksacta Open woods, woodland borders and clearings, thickets, grassy meadows, savannas, limestone glades, tallgrass prairies, blackland prairies, stream banks and disturbed roadsides or railroad rights of way.

propta Seed, Cuttings, Division. *Heliopsis helianthoides* establishes readily from seed when planted in the winter/fall or early in spring (March to April). Germination generally starts four weeks after sowing if soil temperatures remain in the 60 - 70 degree Fahrenheit range. Seeds ripen approximately one month after flowering, however as with many Asters, plants are self sterile. It may be necessary to crack open a few seeds to make sure they are viable. Cuttings and Divisions: Five to seven node cuttings taken from the top 12 inches of growth in late spring root easily. Cuttings are sometimes reluctant to overwinter. Divide plants in the fall for best results [318-1].

nwatta An upright clumping perennial wildflower with sunflower-like heads. It performs well in dry (xeric) locations, in poor to average soils, and in full sun to partial shade. Flowering can be extended by removing spent flowers. Staking may be necessary in shady locations [318-1]. USDA Hardiness Zones: 3 - 9. Soil pH: 6.0 - 8.0. Growth Rate: Moderate. Life Span: Short-Lived Perennial. Stand Persistence: Long. Form: Upright. Texture: Coarse. Sun: Full Sun, Partial Shade. Soil Type: Loamy, Silty, Clay. Soil Moisture: Moderate, Dry. Minimum Root Depth: 12 inches. Root Type: Tap, Stolon. Fungal Types: Endomycorrhizal. Seasonal Interest: Summer. Fruit Type: Achene. Flower Color: Yellow. Drought: Tolerant. Flood: Moderate. Salt: Moderate. Soil Compaction: Moderate. Mowing: Tolerant. Fire Damage: Tolerant. Cold Injury: Infrequent. Wind Storm Damage: Infrequent. Disease Issues: Minor. Insect/Pest Damage: Minor. Animal Damage: Deer, Gophers, Mice, Rabbits. Growing Season: Warm. Bloom Time: Early Summer - Late Summer. Fruit Time: Summer - Fall [318-1]. 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]. Several cultivars are available with flowers of varying colors and shades. These include 'Summer Sun', 'Golden Plume', and 'Prairie Sunset'. The following cultivars of *H. helianthoides* var. *scabra* ("rough") have gained the Royal Horticultural Society's Award of Garden Merit: 'Benzinggold', 'Light of London', 'Spitzentänzerin', 'Waterperry Gold'.

4.2.194 Leonurus cardiaca

Motherwort, Common motherwort

3 tlin 7 cyuc 2 kcaak 0 tcan 3 dwat 1 m hkuc

Small Solomon's Seal
3 tlin 7 cyuc 2 kcaak 2 tcan 1 dwat 1 m hkuc
pcimhmim cyutli tcup hwicli hrasjrlutnyik hpa7tli flatprikliw
hpa7tmwatli fyifxre7t hjonli

drutta *Leonurus cardiaca* is a PERENNIAL growing to 1 m (3ft 3in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to September, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

psicta Skin contact with this plant can cause dermatitis in susceptible people[21]. The fragrant essential oil can cause photosensitization[274]. Grazing animals can have their mouths injured by the sharp teeth of the calyces[274]. Avoid during pregnancy as it is a uterine stimulant although it has been used during labour [301].

kcakta Edible Parts: Edible Uses: Condiment TeaThe fresh or dried flowers can be used as a flavouring in soups, particularly lentil or split pea[183]. They are also used as a flavouring in beer[183]. Fresh or dried flowers can be used to make a tea[183].

tcanta DyeA dark olive-green dye is obtained from the leaves[46, 61, 145].

dwatta Antiarrhythmic Antiflatulent Antispasmodic Astrogenic Birthing aid Cardiac Diaphoretic Emmenagogue Homeopathy Nervine Sedative Stomachic Tonic Women's complaintsMotherwort is especially valuable in the treatment of female weaknesses and disorders, allaying nervous irritability, inducing quiet and passivity of the whole nervous system[4]. It is also seen as a remedy for heart palpitations, it has a strengthening effect, especially on a weak heart[254]. The antispasmodic and sedative effects promote relaxation rather than drowsiness[254]. The leaves are antispasmodic, astrigent, cardiac, diaphoretic, emmenagogue, mervine, sedative, stomachic, tonic and uterine stimulant[4, 9, 21, 46, 165, 222]. They are taken internally in the treatment of heart complaints (notably palpitations) and problems associated with menstruation, childbirth and menopause, especially of nervous origin[238]. Although an infusion can be used, the taste is so bitter that the plant is usually made into a conserve or syrup[244]. An alcoholic extract is said to possess superior action to valerian (*Valeriana officinalis*)[240]. The plant has been found effective in the treatment of functional heart complaints due to autonomic imbalance, and also as an anti-thyroid treatment, though it needs to be taken for several months for these effects to be noticed[244]. The whole herb is harvested in August when in flower and can be dried for later use[4]. It should not be prescribed in the earlier stages of pregnancy or where periods are heavy[238, 254]. A homeopathic remedy is made from the plant[9]. It is used in the treatment of heart complaints, amenorrhoea, menopausal problems and flatulence[9]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Leonurus cardiaca* Motherwort for nervous heart complaints (see [302] for critics of commission E).

nrakta Europe. Naturalized in Britain. ksacta Hedge banks, waste places etc[9, 17], usually on gravelly or calcareous soils[4].

propta Seed - sow spring in a cold frame. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. If you have sufficient seed then it can be sown in an outdoor seedbed, or even in situ. Division in spring or autumn[238]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta An easily grown plant that succeeds in most soils[4], preferring one on the poor side[108]. This plant was at one time cultivated for its medicinal uses[4]. The whole plant is deliciously pungent when handled[245]. The plant often self-sows when well-sited[200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [2-1].

4.2.195 Polygonatum biflorum

Small Solomon's Seal
3 tlin 7 cyuc 2 kcaak 2 tcan 1 dwat 1 m hkuc
pcimhmim cyutli tcup hwicli hrasjrlutnyik hpa7tli flatprikliw
hpa7tmwatli fyifxre7t hjonli

drutta *Polygonatum biflorum* is a PERENNIAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by 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 full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

psicta The fruit and seed are possibly poisonous[65].

kcakta Edible Parts: Leaves RootEdible Uses: Young shoots - raw or cooked[159, 177]. An excellent vegetable when boiled and used as an asparagus substitute[183]. Root - cooked[61]. The flavour is somewhat bitter, to counteract this the root is sliced crosswise, cooked in alkaline water and the water changed during the cooking process[183]. When steamed and sun-dried nine times the root is delicious[179]. The roots are rich in starch, this can be extracted by beating or grinding the dried root, the starch can then be used to make bread or can be mixed in other foods such as soups[159, 183, 257].

tcanta IncenseThe root has been burnt as an incense[257]. It is said that when the root is burnt in the bedroom just before going to sleep, the person would sleep soundly and awaken refreshed, rested and feeling young[257].

dwatta Laxative Poulitive SedativeA tea made from the roots is laxative[222]. It has been used in the treatment of indigestion, profuse menstruation, lung ailments, general debility etc[222]. It is a folk remedy for piles, rheumatism and skin irritations[222]. A poultice or a decoction of the fresh roots is applied to cuts, bruises, sores etc[222, 257].

nrakta N. America - New Brunswick to Michigan, south to Tennessee and Florida ksacta Dry to moist sandy, loamy or rocky deciduous woods and thickets, usually in upland areas[43].

propta Seed - best sown as soon as it is ripe in early autumn in a shady part of a cold greenhouse[200]. Sow stored seed as early in the year as possible. Germination can be slow, they may not come true to type[200] and it takes a few years for them to reach a good size. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in a shady 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. Division in March or October. 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 fertile humus rich moisture-retentive well-drained soil in cool shade or semi-shade[200]. Plants are intolerant of heat and drought but they tolerate most other conditions[200]. A very ornamental plant, it grows well in woodland and copses[1, 42]. Members of this genus are rarely if ever troubled by browsing deer or rabbits[233]. The young shoots are very attractive to slugs[K]. Hybridizes with other members of this genus[200]. *Polygonatum biflorum* var. *commutatum* (Schult. and Schult.f.) Morong is a synonym of *Polygonatum biflorum* (Walter) Elliott The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous

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

4.2.196 *Lythrum salicaria*

Purple Loosestrife

3 tlin 10 cyuc 2 kcaak 0 tcan 3 dwat 1 m hkuc
hmmihmtut cyutli tcuphja7nhs6s hwicli hrasjlutnyikfrip
hpa7tli flatpriklwis hpa7tmwatli xre7t hjonli

drutta *Lythrum salicaria* is a PERENNIAL growing to 1 m (3ft 3in) by 0.5 m (1ft 8in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can grow in water.

kcakta Edible Parts: Leaves RootEdible Uses: ColouringLeaves - cooked[13, 46, 61, 105]. Rich in calcium[179]. Root - cooked[13]. An edible dye is obtained from the flowers[13].

tcanta Cosmetic Dye Preservative Tannin TeethA decoction of the plant is impregnated into wood, rope etc to prevent it rotting in water[74]. The leaves contain about 12% tannin, the stems 10.5%, the flowers 13.7% and the roots 8.5%[218]. It is probably these tannins that preserve the wood etc[218]. The powdered plant is used cosmetically in face-packs to counteract reddened skin[7].

dwata Antibiotic Antidiarrhoeal Astringent Dysentery Eczema Hypoglycaemic Styptic VulneraryPurple loosestrife is an astringent herb that is mainly employed as a treatment for diarrhoea and dysentery. It can be safely taken by people of all ages and has been used to help arrest diarrhoea in breast-feeding babies[254]. It can also be used to treat heavy periods and inter-menstrual bleeding[254]. Modern research has shown the whole plant to be antibiotic and to be particularly effective against the micro-organism that causes typhus[254]. The flowering plant is antibiotic, highly astringent, hypoglycaemic, styptic and vulnerary[4, 7, 9, 21, 152, 218, 238]. It is valued as an intestinal disinfectant, especially in cases of enteritis[7], an infusion is used internally in the treatment of diarrhoea, internal bleeding, excessive menstruation etc[9, 222, 238]. The flowering plant is harvested in the summer and can be used fresh or dried[9]. Externally, the plant is used as a cleansing and healing wash for wounds, sores, impetigo, eczema, excess vaginal discharge, vaginal itching etc[7, 222, 238, 254]. The powdered plant is used as a haemostatic in cases of severe nosebleeds[7]. The stems are regarded as gum stimulators and are given to children to chew in order to strengthen weak or bleeding gums[7].

nrakta Europe, including Britain, south to N. Africa east to western and northern Asia. N. America.. ksacta Reed swamps at the margins of lakes and slow-flowing rivers, fens and marshes, avoiding acid soils[17].

propta Seed - sow in the autumn or the spring in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. If you have sufficient seed it could be worthwhile trying a sowing in situ in the autumn or the spring. Division in March or October[188]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring. Basal cuttings in the spring[238]. Harvest the shoots with plenty of underground stem when they are about 8 - 10cm above the ground. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer.

nwata Landscape Uses:Container, Massing, Rock garden, Seashore, Specimen. Succeeds in ordinary garden soil, especially if it is damp[1]. Prefers a neutral to alkaline soil[238]. Grows well in heavy clay soils. Grows well in marshy soils[24] and succeeds in shallow water at the edges of ponds[56]. Succeeds in full sun or partial shade[188]. A very hardy plant, tolerating temperatures down to at least -25°C[187]. This species can be very invasive and has been declared a noxious weed in some countries. Since being introduced in N. America it has invaded native marshlands,

flourishing large areas of dense stands and crowding out many native species[274]. A very ornamental plant[1]. A good bee and butterfly plant[24]. Plants usually self-sow when well sited[200]. Special Features:Invasive, Naturalizing, Attracts butterflies, Suitable for cut flowers. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [2-1].

4.2.197 *Solidago canadensis scabra*

Canadian Goldenrod

3 tlin 7 cyuc 2 kcaak 0 tcan 2 dwat 1.8 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatpriklwis hpa7tmwatli xre7t hjonli

drutta *Solidago canadensis scabra* is a PERENNIAL growing to 1.8 m (6ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from August to September, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Leaves SeedEdible Uses: TeaYoung leaves and flowering stems - cooked[172]. Seed[22, 46, 61, 105, 161, 183]. It can be used as a thickener in soups[172]. The seed is very small and fiddly to harvest or utilize[K]. A tea can be made from the flowers and/or the leaves[172, 183].

tcanta Dye LatexA source of latex, contained in the leaves. A potentially good source of rubber[61]. Mustard, orange and brown dyes can be obtained from the whole plant[168].

dwata Antiseptic Haemostatic Salve Skin StypticThe whole plant is antiseptic, haemostatic, salve and styptic[168, 172, 257]. An infusion of the dried powdered herb can be used as an antiseptic[168]. A poultice of the flowers has been used in the treatment of ulcers and burns[257]. A poultice of the moistened, crushed root has been used in the treatment of boils[257].

nrakta Eastern N. America - Maine to Ontario, Nebraska, Georgia and Texas. ksacta Dry to damp thickets, roadsides and clearings[43].

propta Seed - sow spring in a cold frame. Only just cover the seed and do not allow the compost to become dry. Prick out the seedlings into individual pots when they are large enough to handle, and grow them on for their first winter in pots. Plant them out into their permanent positions in spring or early summer. Division in spring or autumn. 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.

nwata Succeeds in any moderately fertile moisture retentive soil in sun or semi-shade[200]. Grows well in heavy clay soils. A rather greedy plant, it is apt to impoverish the soil[1]. Hybridizes freely with *S. canadensis*[43]. The plant attracts various beneficial insects such as ladybirds, lacewings and hoverflies to the garden, these insects will help to control insect pests in the garden[201, 238].

4.2.198 *Oenothera glazioviana*

Large-Flower Evening Primrose, Redsepal evening primrose
3 tlin 7 cyuc 2 kcaak 0 tcan 2 dwat 1.5 m hkuc
htut cyutli kyuctup hwicli hrasjlut hpa7tli flatpriklwis hpa7tmwatli fyfxre7t hjonli

drutta *Oenothera glazioviana* is a BIENNIAL growing to 1.5 m (5ft). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to October, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Lepidoptera (Moths and Butterflies), bees. The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils and prefers

well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Leaves Oil Root Edible Uses: Oil-Root - cooked. Boiled and eaten like salsify[144]. Fleshy and succulent. Young shoots - raw or cooked[144]. Mild and inoffensive[144] Seed contains 28% of a drying oil[114]. It is edible and a very good source of gammalinolenic acid[141], an essential fatty acid that is not found in many plant sources and has numerous vital functions in the body. Difficult to harvest, it has to be done by hand[160].

dwatta Anticholesterolemic Astringent Hypotensive Miscellany Sedative The oil in the seeds is anticholesterolemic, astringent, hypotensive, sedative[4, 21]. Reduces cholesterol levels[66]. Research suggests that the oil is potentially very valuable in the treatment of multiple sclerosis, pre-menstrual tension, hyperactivity etc[66].

nrakta A hybrid of garden origin, probably *O. grandiflora* x *O. elata*. ksacta Not known in the wild[200].

propta Seed - sow in situ from late spring to early summer.

nwatta Prefers a dryish well-drained sandy loam and full sun[1, 200]. Heavy clay soils may induce winter rots[200]. Succeeds on poor soils[200]. The flowers open in the evenings, they are richly scented and are very attractive to moths[4]. The seeds are a good food source for birds, especially finches[200]. The plants of this species are of hybrid origin and usually mutate freely[1]. Usually self-sows freely if in a suitable position[K].

4.2.199 Aster cordifolius

Common Blue Wood Aster

3 tlin 7 cyuc 2 kcaak 2 tcan 1 dwat 1.5 m hkuc
htut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis
hpa7tmwatli fyifxre7t hjonli

drutta Aster cordifolius is a PERENNIAL growing to 1.5 m (5ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Leaves Edible Uses: Leaves - cooked and used as greens[207].

dwatta Antirheumatic Aromatic Nervine An infusion of the plant is used as an aromatic nervine and also in the treatment of rheumatism[207].

nrakta Eastern N. America - Nova Scotia and New Brunswick to Ontario, Minnesota, Georgia and Missouri. ksacta Woods and thickets[235].

propta Seed - surface sow in spring in a cold frame. Do not allow the compost to become dry. Pre-chilling the seed for two weeks can improve germination rates[134]. The seed usually germinates in 2 weeks at 20°C[134]. When large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. Division in spring or autumn[200]. Basal cuttings in late spring. Harvest the shoots when they are about 10 - 15cm long with plenty of underground stem. Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer.

nwatta Succeeds in most good garden soils[1], preferring one that is well-drained and moisture retentive[200]. Prefers a sunny position[200]. Prefers a rich soil[1]. Plants can be naturalized in a woodland or other wild garden[200]. Most species in this genus seem to be immune to the predations of rabbits[233]. Hybridizes freely with other members of this genus[200].

4.2.200 Chrysothamnus viscidiflorus

Green Rabbitbrush, Yellow rabbitbrush

3 tlin 7 cyuc 2 kcaak 2 tcan 1 dwat 1 m hkuc
htut cyutli hgatkyuctup hwicli hyishrasljut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Chrysothamnus viscidiflorus is a deciduous Shrub growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils, 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.

kcakta Edible Parts: Edible Uses: Condiment Gum A latex obtained from the root is used as a chewing gum[46, 61, 105, 257]. The plant has been used as a spice[257].

tcanta Dye Gum Latex The latex obtained from the roots could be used in making rubber[46, 61, 161, 177]. Unfortunately it is not produced in sufficient quantity to make commercial extraction worthwhile[K]. A green dye is obtained from the bark[168]. A yellow-gold dye is obtained from the flowers[168, 257]. It is orange when alum is used as a mordant[257]. It rapidly establishes in disturbed habitat, including burns, flooded washes, and rockslides, so it is a valuable shrub for revegetating damaged land such as overgrazed rangeland and abandoned mining areas.

dwatta Antirheumatic Odontalgic Poultice A poultice made from the chewed plant tips has been applied to boils and rheumatic joints[257]. An infusion of the leaves has been used to treat colds[257]. The finely mashed leaves have been inserted in tooth cavities to treat toothache[257].

nrakta Western N. America - southern British Columbia to California. ksacta Dry open places in lowlands and up to moderate elevations[60].

propta Seed - we have no information for this species but suggest sowing the seed in spring in a greenhouse and only just covering the seed. When 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, July/August in sand in a frame[200].

nwatta Requires a sunny position and prefers a well-drained sandy soil[1, 11]. Plants do not require a rich soil[11]. They tolerate alkaline soils[200]. A very hardy plant but it prefers a drier climate than it finds in Britain though it succeeds in this country if given the protection of a dry sunny wall[200]. A very variable and ornamental species[60]. The leaves and stems are pleasantly aromatic[219].

4.2.201 Calochortus luteus

Yellow Mariposa, Yellow mariposa lily

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat 0.3 m hkuc
htut cyutli hgatkyuctup hwicli hrasljut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Calochortus luteus is a BULB growing to 0.3 m (1ft) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

kcakta Edible Parts: Root Edible Uses: Bulb - raw or cooked[92, 105, 161]. About the size of a walnut, it is very palatable and nutritious[2]. The bulb can be harvested in early spring, peeled and eaten raw[257]. It can also be baked and eaten like potatoes[257]. The bulb can be used as a staple food[2].

nrakta South-western N. America - California ksacta Heavy soils in open places below 600 metres[71]. Also found in pine, evergreen oak and mixed woodlands[90].

propta Seed - sow as soon as ripe or early spring in a cold frame in a very sharply draining medium. Stratification may be helpful. Germination usually takes place within 1 - 6 months at 15°C[138]. Leave the seedlings undisturbed for their first two years growth[138], but give them an occasional liquid feed to ensure they do not become nutrient deficient. It is quite difficult to get the seedlings through their first period of dormancy since it is all too easy either to dry them out completely or keep them too moist when they will

After their second year of growth, pot up the dormant bulbs in late summer and grow them on for at least another 2 years in the greenhouse before trying them outside. Seedlings take about 5 - 7 years to come into flower[214]. Division of the bulbs as soon as the foliage dies down. One report says that the bulbs must be planted into their permanent positions immediately[1], whilst another says that they can be stored overwinter and replanted in the spring[138]. Stem bulbils, harvested from the stems after flowering[200]. They can be stored cool and dry then planted in pots in the cold frame in the spring.

nwatta Requires a deep very well-drained fertile sandy soil in a warm sunny position and must be kept rather dry after it flowers and over winter[1, 90, 200]. This is a rather difficult plant to cultivate in Britain, it is very cold hardy but is intolerant of wetness especially in the winter[42, 90]. It is easiest to grow in a bulb frame but is worth trying outdoors at the base of a south-facing wall, especially with shrubs that like these conditions[120]. Bulbs have succeeded in a cold frame with the cover removed from March to October[214]. Bulbs can be lifted as soon as the foliage dies down in the summer and stored overwinter in a cool dry place, replanting in spring[138]. Another report says that the bulbs must be replanted as soon as they have been divided[1]. Bulbs frequently divide after flowering, the bulblets taking 2 years to reach flowering size[200]. Hand pollination is necessary if seed is required[1]. This species is closely allied to *C. venustus*[90].

4.2.202 *Camassia cusickii*

Cusick's camas

3 tlin 11 cyuc 2 kcak 3 tcan 0 dwat 0.9 m hkuc
hmimhtut cyutli tcup hwicli hrasljut hpa7tli flatprikrlwis
hpa7tmwatli hjonli

drutta *Camassia cusickii* is a BULB growing to 0.9 m (3ft) by 0.6 m (2ft in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no hazards are known *Camassia* spp. can be mistaken for *Zigadenus* spp. when not flowering which are very toxic.

kcakta Edible Parts: RootEdible Uses: Bulb. The cooked bulb has a sweet, anise-squash flavour. Pressure cook at 250°F or 120°C for nine hours. A larger bulb than other species in this genus but the flavour is considered poorer [1-2]. Considered pungent, slimy, and bitter tasting by some (summitpost.org). The bitter taste is due to saponins in the plant. Commonly confused with *C. quamash* where Native Americans would harvest the roots to eat raw as a vegetable, or boiled them to create a sweet, molasses-like treat.

tcanta Uses include food forests, informal gardens, cottage gardens, prairie and meadows. Locations include: garden banks and slopes, beds and borders and can be underplanted with roses and other shrubs. Showy, cut flowers. Thrives among perennials. *C. cusickii* can naturalize and serve as a good ground cover.

nrakta A Pacific Northwest U.S. native that's been cultivated commercially in the Netherlands. **ksacta** Damp meadows at subalpine and alpine elevations (4,000-6,000 feet (1,200-1,800 m) and tolerates pond edges, rich soils, and bloom well in either sun or shade.

propta Propagated by removing the offsets that have formed round the main bulbs. Plant 6 inches (150 mm) deep in late summer or early fall. In very cold areas, the soil should be mulched to protect the bulbs in late autumn.

nwatta Hardy Perennial Bulb found in temperate to subtropical locations. Prefers moist, fertile soil in full sun to partial sunlight. Soil chalk, loam or sand which is acid, alkaline or neutral. It tolerates clay and dry soil. Soil moisture moist but well-drained. Unlike most bulbs, it prefers soil that has a bit more moisture but is intolerant of waterlogging. Deer- and rodent-resistant. Flowers spring to early summer. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where

the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1). For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

4.2.203 *Aquilegia formosa*

Western Columbine

3 tlin 7 cyuc 2 kcak 0 tcan 2 dwat 0.8 m hkuc
hmimhtut cyutli tcup hwicli hrasljut hpa7tli flatprikrlwis
hpa7tmwatli xre7t hjonli

drutta *Aquilegia formosa* is a PERENNIAL growing to 0.8 m (2ft 7in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. 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. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no records of toxicity have been seen for this species, it belongs to a family that contains a number of mildly toxic species. It is therefore wise to exercise some caution. The flowers are probably perfectly safe to eat.

kcakta Edible Parts: Flowers Leaves RootEdible Uses: Flowers - raw. Rich in nectar, they are sweet and delightful[172, 213], they make a very attractive addition to mixed salads and can also be used as a thirst-quenching munch in the garden[K]. Children enjoy sucking out the sweet nectar from the base of the flowers[257]. Early spring greens cooked and eaten as a vegetable[257]. Some caution is advised, see the notes above on toxicity. Root - cooked. Used by the N. American Indians as a famine food[213]. Some caution is advised, see the notes above on toxicity.

tcanta Hair Parasiticide ParasiticideThe seed is used to rid the hair of lice[172, 257]. The whole plant is boiled up and used as a hair wash[213, 257]. The seeds are aromatic. They can be crushed and rubbed on the body as a perfume or placed in a sachet and stored with clothes to impart a nice smell[257].

dwatta Antispasmodic Diaphoretic Parasiticide Parasiticide Resolvent SalveWestern columbine was quite frequently employed by a number of native North American Indian tribes who used it to treat a variety of complaints[257]. It is little used in modern herbalism. Antispasmodic, diaphoretic, parasiticide, resolvent, salve[172]. A decoction of the root is used in the treatment of diarrhoea and stomach aches[257]. A decoction of the roots and leaves is used in the treatment of VD, dizziness and biliousness[257]. The mashed fresh roots can be rubbed briskly on aching rheumatic joints[257]. A poultice of chewed roots or leaves is applied to bee stings, sores etc[257]. A decoction of the leaves is used in the treatment of sore throats, coughs and colds[257]. The seeds can be chewed as a remedy for stomach aches[257].

nrakta Western N. America - Alaska to California, east to W. Montana and Utah. **ksacta** Widely distributed in many habitats from the coast to the coastal mountains[60]. Moist woods and damp places in scrub and on banks from sea-level to 3000 metres[187].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be slow to germinate[200]. Stored seed can be sown in late winter in a cold frame. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for their first winter. Plant out in late spring or early summer. Division in spring[200].

nwatta Succeeds in ordinary garden soil, preferring a moist but not wet soil and a sheltered sunny position[1] or partial shade[187]. Intolerant of heavy clay[200]. A very ornamental plant, it is hardy to about -15°C[187]. A short-lived species, often dying out after 2 - 3 years, though it usually produces seed prolifically[200, 233]. However, they are very apt to hybridize with other members of the genus and so it becomes difficult to keep a species true to type if more than

one is grown in the garden[200]. This species is closely related to *A. canadensis*[200] and *A. flavescens*[60], often hybridizing with *A. flavescens* in the wild where their ranges overlap[270]. Plants seem to be immune to the predations of rabbits[233]. A greedy plant, inhibiting the growth of nearby plants, especially legumes[54].

4.2.204 *Calochortus nuttallii*

Sego Lily

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat 0.2 m hkuc
htut cyutli hqacucup hwicli hrasljut hpa7tli flatprik
lwis hpa7tmwatli xre7t hjonli

drutta *Calochortus nuttallii* is a BULB growing to 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. 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) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

ksakta Edible Parts: Flowers Leaves Root Seed Edible Uses: Bulb - raw or cooked[207]. Remove the outer husk. Excellent raw, the flavour is greatly improved by slow cooking[183]. The bulbs are said to have a crisp nut-like texture and a pleasant flavour when cooked. The bulbs can also be dried and ground into a powder[207] which can be used with cereal flours when making bread[212]. Leaves - cooked as a potherb[183]. It is hard to obtain a sufficient quantity and this use of the leaves will weaken the plants so is not to be recommended[K]. Seed - ground into a powder[183]. Flowers and flower buds - raw. A tasty addition to the salad bowl[183].

nrakta South-western N. America - California to New Mexico. ksacta Dry soils with grass and scrub, 1500 - 2800 metres[90].

propta Seed - sow as soon as ripe or early spring in a cold frame in a very sharply draining medium. Stratification may be helpful. Germination usually takes place within 1 - 6 months at 15°C[138]. Leave the seedlings undisturbed for their first two years growth[138], but give them an occasional liquid feed to ensure they do not become nutrient deficient. It is quite difficult to get the seedlings through their first period of dormancy since it is all too easy either to dry them out completely or keep them too moist when they will rot[214]. After their second year of growth, pot up the dormant bulbs in late summer and grow them on for at least another 2 years in the greenhouse before trying them outside. Seedlings take about 5 - 7 years to come into flower[214]. Division of the bulbs as soon as the foliage dies down. One report says that the bulbs must be planted into their permanent positions immediately[1], whilst another says that they can be stored overwinter and replanted in the spring[138]. Stem bulbils, harvested from the stems after flowering[200]. They can be stored cool and dry then planted in pots in the cold frame in the spring.

nwata Requires a deep very well-drained fertile sandy soil in a warm sunny position and must be kept dry from mid summer to late autumn[1, 90, 200]. This is a rather difficult plant to cultivate in Britain, it is very cold hardy but is intolerant of wetness especially in the winter[42, 90]. It is easiest to grow in a bulb frame[90] but is worth trying outdoors at the base of a south-facing wall, especially with shrubs that like these conditions[120]. Bulbs can be lifted as soon as the foliage dies down in the summer and stored overwinter in a cool dry place, replanting in spring[138]. Another report says that the bulbs should be replanted immediately[1]. Bulbs frequently divide after flowering, the bulblets taking 2 years to reach flowering size[200]. Hand pollination is necessary if seed is required[1]. A very ornamental plant[1], it is the state flower of Utah[85, 95].

4.2.205 *Artemisia frigida*

Fringed Wormwood, Prairie sagewort

3 tlin 10 cyuc 2 kcaak 3 tcan 2 dwat 0.3 m hkuc
htut cyutli hqacucup hwicli hrasljut hpa7tli flatprik
lwis hpa7tmwatli xre7t hjonli

drutta *Artemisia frigida* is a PERENNIAL growing to 0.3 m (1ft) by 0.5 m (1ft 8in). See above for USDA hardiness.

It is hardy to UK zone 4. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. 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. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista Although no reports of toxicity have been seen for this species, skin contact with some members of this genus can cause dermatitis or other allergic reactions in some people[222].

ksakta Edible Parts: Edible Uses: Condiment The leaves are used by the Hopi Indians as a flavouring for sweet corn[61, 172, 177, 183, 257].

tcanta Deodorant Disinfectant Dye Essential Repellent - Both the growing and the dried plant can be used as an insect repellent[172]. The leaves can be placed on a camp fire to repel mosquitoes[257]. The aromatic leaves have been used in pillows etc as a deodorant[257]. Bunches of the soft leaves have been used as towels, toilet paper etc[257]. A green dye is obtained from the leaves[257]. Cultivated for its foliage effects, and has gained the Royal Horticultural Society's Award of Garden Merit. Used in landscaping and for erosion control and revegetation of rangeland. It is drought-resistant. Provides shelter for beneficial invertebrates; insects and other arthropods. A specialist nectary plant [1-2]. Groundcover [1-2].

dwatta Antispasmodic Deodorant Disinfectant Poultrice Stimulant Stomachic Vermifuge Women's complaints The leaves are stomachic, vermifuge and used in the treatment of women's complaints[172]. The plant contains camphor, which is stimulant and antispasmodic[213]. An infusion of the leaves is used in the treatment of biliousness, indigestion, coughs and colds whilst the leaves are chewed and the juice swallowed to treat heartburn[257]. A poultice of the chewed leaves is used as a poultice to reduce swellings and the leaves are also placed in the nose to stop nosebleeds[257]. A hot poultice of the leaves has been used to treat toothache[257]. The leaves can be used as a sanitary towel to help reduce skin irritation[257]. They are also drunk as a tea when the woman is menstruating or to treat irregular menstruation[257]. The dried leaves are burnt in a room as a disinfectant[257]. A decoction of the root is used as a stimulant and tonic[257].

nrakta N. America - Minnesota to Saskatchewan, Yukon, Texas and Arizona. N. Asia. ksacta Dry prairies, plains and rocks to 3300 metres in N. America[43, 164].

propta Seed - surface sow from late winter to early summer in a greenhouse in a very free-draining soil, but make sure that the compost does not dry out. The seed usually germinates within 1 - 2 weeks in a warm greenhouse. When large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out in late spring or early summer. Cuttings of half-ripe wood, July/August in a frame. Division in spring or autumn[200].

nwata Requires a sunny position and a well-drained soil that is not too rich[1, 200]. Requires a lime-free soil. Established plants are very drought tolerant[200]. Plants are longer lived, more hardy and more aromatic when they are grown in a poor dry soil[245]. A very ornamental plant[1]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

4.2.206 *Epigaea repens*

Mayflower, Trailing arbutus, Ground Laurel

3 tlin 8 cyuc 2 kcaak 2 tcan 2 dwat 0.1 m hkuc
hmim cyutli tcup hwicli hrasljut hpa7tli frusflatprik
hpa7tmwatli xre7t hjonli

drutta *Epigaea repens* is an evergreen Shrub growing to 0.1 m (0ft 4in) 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 leaf all year, in flower from April to May. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid and neutral soils and can grow in very acid

soils. It can grow in semi-shade (light woodland). It prefers moist soil.

ksakta Edible Parts: Flowers**Edible Uses:** Flowers - raw. Fragrant, with a spicy slightly acid flavour[105], they are eaten as a wayside nibble or are added to salads[183]. Thirst quenching[177].

tcanta Plants can be grown for ground cover, they should be spaced about 25cm apart each way and form a carpet of growth[208]. This species is probably not very worthwhile for ground cover in Britain because of its difficulty to cultivate[208].

dwatta Astringent Diuretic Tonic UrinaryMayflower is rarely used medicinally, even in folk medicine, though it is a strong urinary antiseptic and is one of the most effective remedies for cystitis, urethritis, prostatitis, bladder stones and particularly acute catarrhal cystitis[268]. The leaves are astringent, diuretic and tonic[46, 61]. An infusion is made from the dried leaves, or a tincture from the fresh leaves[4]. A tea made from the leaves is used in the treatment of kidney disorders, stomach aches, bladder disorders etc[222]. It is of special value when the urine contains blood or pus[4]. Use with caution, the plant contains arbutin and, although this is an effective urinary disinfectant, it hydrolyzes to hydroquinone which is toxic[222]. The leaves can be used fresh or can be harvested in the summer and dried for later use[238, 268].

nrakta Eastern N. America - Newfoundland to Florida and west to Tennessee, Ohio and Michigan. **ksakta Damp mossy banks** in sandy and peaty woods and clearings[43, 268], usually under pine trees[4].

propta Seed - best sown as soon as it is ripe in a shady position in a cold frame[200]. Another report says that the seed requires no pre-treatment and can be sown in late winter in a cold frame[113]. Surface sow and place the pot in light shade, do not allow it to dry out[113]. The seed usually germinates in 3 - 5 weeks[113]. As soon as they are large enough to handle, pot up the seedlings into individual pots. Be very careful since they strongly resent root disturbance. Grow them on in light shade in the greenhouse and plant them out in their permanent positions in the late spring of their second years growth. Cuttings of half-ripe wood, July/August in a frame[200]. Take the cutting with a part of the previous year's growth[113]. (This report is unclear as to whether it means a heel of older wood or just a small section of older wood[K]) Plants self-layer and can be divided in the spring but this must be done with great care since they deeply resent root disturbance[200].

nwatta Landscape Uses:Rock garden, Woodland garden. Requires an open lime-free humus-rich soil and shade from direct sunlight[11, 182, 200]. Grows well in the shade of other calcifuge plants such as rhododendrons and also under pine trees[245]. A very cold-hardy plant but it is often excited into premature growth by mild winter weather and is then subject to damage by frost[11]. The flower buds require a period of chilling to about 2°C before they will open[200]. The flowers are deliciously and strongly scented[200] with a rich spicy perfume[245]. There are some named varieties, selected for their ornamental value[200]. A difficult plant to grow in cultivation[200] and very hard to transplant successfully[182]. Another report says that although the genus is generally difficult to cultivate, this species is relatively easy to grow[188]. **Special Features:**Attractive foliage, Fragrant flowers. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. A clumping mat former. Forming a dense prostrate carpet spreading indefinitely [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 a tap root similar to a carrot going directly down [1-2].

4.2.07 Calochortus gunnisonii

Mariposa Lily, Gunnison's mariposa lily
3 tlin 7 cyuc 2 kcaok 0 tcan 1 dwat 0.3 m hkuc
htuc cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Calochortus gunnisonii is a BULB growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

ksakta Edible Parts: Flowers **Leaves Root SeedEdible Uses:** Bulb - raw or cooked[46, 105, 161]. One report says that the raw bulb tastes like a raw new potato[183]. It has a crisp nut-like texture and a pleasant flavour when cooked[85, 183]. The bulb can be dried and ground into a powder for making a sweet porridge, mush etc[85, 183, 257]. Leaves - cooked. It is hard to obtain a sufficient quantity[85] and use of the leaves will weaken the bulbs. Seed - ground into a powder[85, 183]. Flower buds - raw. Added to salads[85, 183].

dwatta Antirheumatic MiscellanyAn infusion of the plant has been taken internally to treat rheumatic swellings and to ease the delivery of the placenta[257].

nrakta South-western N. America - Rocky Mountains. **ksakta Grassy hillsides** and open coniferous woods[60]. Found in a variety of habitats from moist meadows and open woods to sandy and rocky hillsides and dry gulches between 1,200 and 3,300 metres[214].

propta Seed - sow as soon as ripe or early spring in a cold frame in a very sharply draining medium. Stratification may be helpful. Germination usually takes place within 1 - 6 months at 15°C[138]. Leave the seedlings undisturbed for their first two years growth[138], but give them an occasional liquid feed to ensure they do not become nutrient deficient. It is quite difficult to get the seedlings through their first period of dormancy since it is all too easy either to dry them out completely or keep them too moist when they will rot[214]. After their second year of growth, pot up the dormant bulbs in late summer and grow them on for at least another 2 years in the greenhouse before trying them outside. Seedlings take about 5 - 7 years to come into flower[214]. Division of the bulbs as soon as the foliage dies down. The bulbs can be planted straight out into their permanent positions but in areas with wet winters it might be best to store them overwinter and replant them in the spring. Stem bulbs, harvested from the stems after flowering. They can be stored cool and dry then planted in pots in the cold frame in the spring.

nwatta Requires a deep very well-drained fertile sandy soil in a sunny position and must be kept dry from mid summer to late autumn[1, 60, 200]. This is a rather difficult plant to cultivate in Britain, it is very cold hardy but is intolerant of wetness especially in the winter[1, 42]. It is easiest to grow in a bulb frame but is worth trying outdoors at the base of a south-facing wall, especially with shrubs that like these conditions[120]. Bulbs can be lifted as soon as the foliage dies down in the summer and stored overwinter in a cool dry place, replanting in the spring[138]. The bulbs must be replanted immediately according to another report[1]. Bulbs frequently divide after flowering, the bulbets taking 2 years to reach flowering size[200]. This species is closely related to *C. ambiguus*[214]. Hand pollination is necessary if seed is required[1].

4.2.08 Aquilegia coerulea

Rocky Mountain Columbine, Colorado blue columbine, Daley's columbine, White Colorado columbine
3 tlin 7 cyuc 2 kcaok 0 tcan 1 dwat 0.6 m hkuc
hmimhtuc cyutli tcup hwicli hrasjlut hpa7tli flatprikwlis
hpa7tmwatli xre7t hjonli

drutta Aquilegia coerulea is a PERENNIAL growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can

growing in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no records of toxicity have been seen for this species, it belongs to a family that contains a number of mildly toxic species. It is therefore wise to exercise some caution. The flowers are probably perfectly safe to eat.

kcakta Edible Parts: Flowers**Edible Uses:** Flowers - raw. Rich in nectar, they have a sweet taste[172], they make a very attractive addition to mixed salads and can also be used as a thirst-quenching munch in the garden[K].

tcanta Parasiticide ParasiticideThe seed is used as a parasiticide to rid the hair of lice[172].

dwatta Antispasmodic Diaphoretic Parasiticide Parasiticide Resolvent SalveAntispasmodic, diaphoretic, parasiticide, resolvent, salve[172]. The seed was chewed, or an infusion of the root was used, to treat abdominal pains and general sickness[257].

nrakta Western N. America - Montana to Arizona and New Mexico. ksacta A wide range of habitats, especially in aspen groves[187], in the upper levels of the Rockies[60]. Rocky slopes or near streams in open woodland or herbland at elevations of 2100 - 3600 metres[270].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be slow to germinate[200]. Stored seed can be sown in late winter in a cold frame. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for their first winter. Plant out in late spring or early summer. Division in spring[200].

nwatta Succeeds in ordinary garden soil, preferring a moist but not wet soil and a sheltered sunny position[1]. It also succeeds in partial shade[187]. Intolerant of heavy clay soils[200]. A very ornamental plant, it is the state flower of Colorado[187, 270]. Most species are short-lived, dying out after 2 - 3 years, though they usually produce seed prolifically[200]. However, they are very apt to hybridize with other members of the genus and so it becomes difficult to keep a species true to type if more than one is grown in the garden[200]. Plants seem to be immune to the predations of rabbits[233]. A greedy plant, inhibiting the growth of nearby plants, especially legumes[54].

4.2.209 *Aquilegia jonesii*

Columbine, Jones' columbine, Blue limestone columbine
3 tlin 7 cyuc 2 kcak 0 tcان 1 dwat 0.1 m hkuc
hmimhtut cyutli tcup hwicli hrasjlut hpa7tli flatprikhwis
hpa7tmwatli xre7t hjonli

drutta *Aquilegia jonesii* is a PERENNIAL growing to 0.1 m (0ft 4in) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no records of toxicity have been seen for this species, it belongs to a family that contains a number of mildly toxic species. It is therefore wise to exercise some caution. The flowers are probably perfectly safe to eat.

kcakta Edible Parts: Flowers**Edible Uses:** Flowers - raw. Rich in nectar, they are sweet and delightful[172], they make a very attractive addition to mixed salads and can also be used as a thirst-quenching munch in the garden[K].

tcanta Parasiticide ParasiticideThe seed is used as a parasiticide to rid the hair of lice[172].

dwatta Antispasmodic Diaphoretic Parasiticide Parasiticide Resolvent SalveAntispasmodic, diaphoretic, parasiticide, resolvent, salve[172].

nrakta Western N. America - Alberta, Montana and Wyoming. ksacta Usually sub-alpine on scree slopes or in rock crevices in limestone areas only at elevations of 1800 - 3400 metres[60, 270].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be slow to germinate[200]. Stored seed can be sown in late winter in a cold frame. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for their first winter. Plant out in late spring or early summer. Division in spring[200].

nwatta Prefers a well-drained friable sandy loam with leaf mold[1]. Intolerant of heavy clay[200]. A very ornamental plant[1]. This species deeply resents root disturbance and cannot be transplanted[60]. Most species are short-lived, dying out after 2 - 3 years, though they usually produce seed prolifically[200]. However, they are very apt to hybridize with other members of the genus and so it becomes difficult to keep a species true to type if more than one is grown in the garden[200]. Plants seem to be immune to the predations of rabbits[233]. A greedy plant, inhibiting the growth of nearby plants, especially legumes[54].

4.2.210 *Zizia aurea*

Golden Alexanders, Golden zizia
3 tlin 7 cyuc 2 kcak 0 tcان 1 dwat 0.8 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikhwis
hpa7tmwatli fyifxre7t hjonli

drutta *Zizia aurea* is a PERENNIAL growing to 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

pcista There is a report that the root might be toxic[222]. **kcakta Edible Parts:** Flowers**Edible Uses:** The flowers, with the main stem removed, are a welcome addition to a tossed green salad. They are also a delicious cooked vegetable when used in a similar manner to broccoli[183].

dwatta **Feribrufige Hypnotic Vulnerary**A tea made from the root is febrifuge[222, 257]. The root is also believed to be vulnerary and hypnotic[222].

nrakta Eastern N. America - Quebec to Saskatchewan and south to Texas and Florida. ksacta Moist meadowland[200]. Dry woods and rocky outcrops[222]. Low woods in Texas[274].

propta Seed - we have no information for this species but it is probably best sown in spring in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts.

nwatta Requires a moist soil and a position in full sun[200]. Suitable for the wild garden and other informal plantings as well as collections of native wild flowers[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. An evergreen. The plant growth habit is a clumper with limited spread [1-2].

4.2.211 *Dryopteris expansa*

Spiny Wood Fern, Spreading woodfern
3 tlin 7 cyuc 2 kcak 0 tcان 3 dwat 0.4 m hkuc
pcimhmim cyutli tcup hwicli hrasjlutnyik hpa7tli flatprik
hpa7tmwatli hjonli

drutta *Dryopteris expansa* is a FERN growing to 0.4 m (1ft 4in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. The seeds ripen from July to September. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid and neutral soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

pcista Although we have found no reports for this species, a number of ferns contain carcinogens so some caution is advisable[200]. The fresh plant contains thiaminase, an enzyme that robs the body of its vitamin B complex. In small quantities this enzyme will do no harm to people eating an adequate diet that is rich in vitamin B, though large quantities can cause severe health problems. The enzyme is destroyed by heat or thorough drying, so cooking the plant will remove the thiaminase[172]. However, there have been reports for other species of ferns suggesting that even cooked fronds can have a long term harmful effect. Some caution is therefore advised.

kcakta Edible Parts: Leaves **Root****Edible Uses:** Root - raw or cooked[256]. Baked and then peeled before being

eat[257]. The raw root is rather bitter but they develop a sweet taste when cooked and are said by some people to develop a flavour rather like sweet potatoes[256]. The root is best harvested in early autumn. At this time the rhizomes are surrounded by scaly, finger-like projections - if the projections are flat and dark inside then the rhizomes are not good to eat but if they are round, fleshy and light-coloured then they can be eaten[256]. The young shoots, harvested in spring before they have fully unfurled, can be cooked and eaten[257]. They can be added to soups[257].

tcanta HairAn infusion of the leaves has been used as a hair wash[257].

dwatta Anthelmintic PoultriceA poultice of the pounded roots has been applied to cuts[257]. We have no other reports for this species, but the following uses apply to many members of this genus and quite probably also to this species[K]. The root contains 'filicin', a substance that paralyses tapeworms and other internal parasites and has been used as a worm expellent[4, 172, 238]. It is one of the most effective treatments known for tapeworms - its use should be immediately followed by a non-oily purgative such as magnesium sulphate in order to expel the worms from the body[238]. An oily purge, such as castor oil, increases the absorption of the fern root and can be dangerous[238]. The root is harvested in the autumn and can be dried for later use, it should not be stored for longer than 12 months[238]. This remedy should be used with caution and only under the supervision of a qualified practitioner[238]. The root is toxic and the dosage is critical[238]. See also the notes above on toxicity. The root is also used in the treatment of dandruff[4, 172].

nrakta Northern Temperate Zone, including Britain. ksacta Cool moist woods, often on rotting logs and tree stumps[256].

propta Spores - can be sown at any time of the year in a greenhouse. Surface sow on a sterilised compost and keep moist, possibly by placing the pot in a plastic bag. Germinates in 1 - 3 months at 20°C. Pot up small clumps of the plants when they are large enough to handle and grow on in a shady part of the greenhouse until large enough to plant out. Division in spring. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta An easily grown plant[233], it prefers an acid to neutral soil, succeeding in ordinary fertile soil in a shady position[175, 200]. Prefers a moist soil[188]. Closely related to *D. dilatata* and hybridising where their ranges meet to produce *D. x ambroseae*. Members of this genus are rarely if ever troubled by browsing deer[233].

4.2.212 *Alchemilla alpina*

Alpine Lady's Mantle, Mountain Lady's Mantle
3 tlin 7 cyuc 2 kcaok 0 tcan 3 dwat 0.2 m hkuc
hmmihmtut cyutli kyuctcup hwicli hrasjlutnykfrrip hpa7tli flat-prik hpa7tmwatli fyifxre7t hjonli

drutta *Alchemilla alpina* is a PERENNIAL growing to 0.2 m (0ft 8in) by 0.2 m (0ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to September, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Apomictic (reproduce by seeds formed without sexual fusion). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil 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 dry or moist soil.

kcakta Edible Parts: LeavesEdible Uses: TeaThe following uses are for *A. vulgaris*. They quite probably also apply for this species[K]. Young leaves - raw or cooked[5, 7]. A dry, somewhat astringent flavour[K]. They can be mixed with the leaves of *Polygonum bistorta* and *Polygonum persicaria* then used in making a bitter herb pudding called 'Easter ledger' which is eaten during Lent[177, 183]. Root - cooked. An astringent taste[4]. The leaves are used commercially in the blending of tea[7].

dwatta Alterative Antirheumatic Astringent Diuretic Emmenagogue Febrifuge Sedative Styptic Tonic Vulnerary-Lady's mantle has a long history of herbal use, mainly as an external treatment for cuts and wounds, and internally in the

treatment of diarrhoea and a number of women's ailments, especially menstrual problems[9, 244]. This plant, the alpine ladies mantle, has been shown to be more effective in its actions[238, 268]. The herb is alterative, antirheumatic, astringent, diuretic, emmenagogue, febrifuge, sedative, styptic, tonic and vulnerary[4, 7, 9, 21, 46, 165]. The leaves and flowering stems are best harvested as the plant comes into flower and can then be dried for later use[4]. The fresh root has similar and perhaps stronger properties to the leaves, but is less often used[4]. The plant is rich in tannin and so is an effective astringent and styptic, commonly used both internally and externally in the treatment of wounds[4]. It helps stop vaginal discharge and is also used as a treatment for excessive menstruation and to heal lesions after pregnancy[4, 244]. Prolonged use can ease the discomfort of the menopause and excessive menstruation[268]. The freshly pressed juice is used to help heal skin troubles such as acne and a weak decoction of the plant has been used in the treatment of conjunctivitis[244].

nrakta Western and Northern Europe. ksacta Meadows, pastureland and woodland clearings, mainly on acid soils[200].

propta Seed - sow spring in a cold frame. The seed usually germinates in 3 - 4 weeks at 16°C[133]. When large enough to handle, prick the seedlings out into individual pots and grow them on a cold frame for their first winter, planting out in late spring or early summer. Division in spring or autumn. The divisions can be planted out direct into their permanent positions, though we find it best to pot them up and keep them in a sheltered position until they are growing away well.

nwatta Landscape Uses:Alpine garden, Border, Container, Ground cover, Rock garden. Easily grown in ordinary soil in sun or part shade[1, 233]. Prefers a well-drained acid soil[200, 238]. Grows well in heavy clay soils. Succeeds in dry shade[188]. Plants in this genus seem to be immune to the predations of rabbits[233]. Special Features:Attractive foliage, Not North American native, Suitable for cut flowers, Inconspicuous flowers or blooms.

4.2.213 *Maianthemum dilatatum*

Wild Lily Of The Valley, False lily of the valley
3 tlin 7 cyuc 2 kcaok 0 tcan 1 dwat 0.2 m hkuc
pcimhmwn cyutli tcup hwicli hrasjlutnyk hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

drutta *Maianthemum dilatatum* is a PERENNIAL growing to 0.2 m (0ft 8in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from March to April. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: Fruit LeavesEdible Uses: Fruit - raw or dried for later use[118, 177]. The fruits are about the size of small peas and are produced in terminal clusters on the plants, they are not regarded very highly[256]. North American Indian children would eat the raw unripe green berries straight from the plant[256]. Adults would usually harvest the green berries and then store them in water until they turned red and were soft[256]. Alternatively they would dry the green berries and then boil them for a few minutes[256]. Young leaves - cooked[177].

dwatta Infertility Ophthalmic Poultrice TBA poultice made of the whole or the mashed leaves has been applied to boils, burns, cuts and wounds[257]. The fruit has been used as a good medicine in the treatment of tuberculosis[257]. The root has been chewed in order to correct sterility[257]. (This probably means to restore fertility[K]) An infusion of the pounded roots has been used as a wash for sore eyes, whilst the chewed roots have been used as a poultice on the eyes[257].

nrakta Western N. America - California to Alaska. ksacta Shaded or moist streambanks and open to dense coniferous and broadleaves woods if they are moist[60, 270], in humus-rich slightly acid soils[200] to 1000 metres[60].

propta Seed - best sown quite thinly if as soon as it is ripe in a cold frame, it should germinate in the spring. Stored

should be sown in late winter in a cold frame, it might take 18 months to germinate. Allow the seedlings to grow on in the pot for their first year, giving liquid feeds as necessary to ensure that they do not go hungry. Divide the plants into individual pots once they have died down in late summer. Grow them on in pots for another year or more until large enough to plant out[K]. Division as new growth commences in the spring. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

Requires a cool shady moist but not wet position[1, 187]. Plants tolerate warm summers only if the soil remains moist[200]. A mat forming plant, it can be invasive in good conditions[200].

4.2.214 *Aquilegia flabellata*

Fan Columbine, Dwarf Columbine

3 tlin 9 cyuc 2 kcaok 0 tcan 0 dwat 0.3 m hkuc hmimhtut cyutli tcup hwicli hrasjlut hpa7tli flatprikhwis hpa7tmwatli xre7t hjonli

drutta *Aquilegia flabellata* is a PERENNIAL growing to 0.3 m (1ft) by 0.2 m (0ft 8in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 6. It is 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. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no records of toxicity have been seen for this species, it belongs to a family that contains a number of mildly toxic species. It is therefore wise to exercise some caution. The flowers are probably perfectly safe to eat.

kcaakta Edible Parts: Flowers Leaves Edible Uses: TeaLeaves - cooked. They must be thoroughly boiled[177]. Caution is advised, see the notes above on toxicity. Flowers - raw. Sweet and delightful[172], they make a very attractive addition to mixed salads and can also be used as a thirst-quenching munch in the garden[K]. The flowers are also used as a tea substitute.

tcanta ParasiticideThe seed is used as a parasiticide to rid the hair of lice[172].

nrakta E. Asia - Japan, Korea. ksacta Scrub in the alpine regions of C. and N. Japan.

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be slow to germinate[200]. Stored seed can be sown in late winter in a cold frame. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for their first winter. Plant out in late spring or early summer. Division in spring[200].

nwatta Landscape Uses:Alpine garden, Container, Rock garden, Seashore. Succeeds in ordinary garden soil, preferring a moist but not wet soil and a sunny position[1]. Intolerant of heavy clay[200]. Hardy to about -20°C[187]. The name of this species is based on the cultivated form, the true wild form is *A. flabellata pumila*. Kudo. There are some named varieties selected for their ornamental value[200]. Most species are short-lived, dying out after 2 - 3 years, though they usually produce seed prolifically[200]. However, they are very apt to hybridize with other members of the genus and so it becomes difficult to keep a species true to type if more than one is grown in the garden[200]. Plants seem to be immune to the predations of rabbits[233]. A greedy plant, inhibiting the growth of nearby plants, especially legumes[54]. Special Features: Attracts birds, Attractive foliage.

4.2.215 *Empetrum eamesii*

Rockberry, Purple crowberry

3 tlin 8 cyuc 2 kcaok 0 tcan 0 dwat 0.2 m hkuc hmimhtut cyutli tcup hwicli hrasjlut hpa7tli frusflat hpa7tmwatli xre7t hjonli

drutta *Empetrum eamesii* is an evergreen Shrub growing to 0.2 m (0ft 8in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. The species is hermaphrodite (has both male and female organs). 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. The plant can tolerate strong winds but not maritime exposure.

kcaakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[177, 200]. The fruit is about 4mm in diameter[200].

tcanta Succeeds as a ground cover plant in exposed positions[200].

nrakta North-eastern N. America - S.E. Labrador to Newfoundland and Nova Scotia. ksacta Exposed sands and siliceous gravels and rocks[43].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be very slow to germinate, stored seed requires 5 months warm then 3 months cold stratification at 5°C[200]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 3cm with a heel, July/August in a frame. Takes 3 weeks. Good percentage[78, 200]. Cuttings of mature wood of the current year's growth, 3cm with a heel, October in a frame. Requires shade. Good percentage[78, 200].

nwatta Landscape Uses:Erosion control, Foundation, Ground cover, Massing, Rock garden. A calcifuge plant, it is easily grown in a lime-free soil[200]. Prefers a moist sandy peaty soil and some shade[1, 3]. The flowers of this species are usually hermaphrodite, but some female flowers are produced[200]. Special Features:Attractive foliage, North American native, Inconspicuous flowers or blooms.

4.2.216 *Podophyllum peltatum*

American Mandrake, Mayapple, Ground Lemon, Mandrake, Mayapple

3 tlin 9 cyuc 2 kcaok 2 tcan 4 dwat 0.3 m hkuc pcmhmim cyutli tcup hwicli hrasjlut hpa7tli frusflatprik hpa7tmwatli dyatxre7t hjonli

drutta *Podophyllum peltatum* is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in leaf from April to October, in flower from May to June, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs). The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

pcista The leaves and the roots are very poisonous[1, 4, 19, 62, 222].

kcaakta Edible Parts: Fruit Edible Uses: Fruit - raw, cooked or made into jams, jellies, marmalades, pies etc[1, 2, 4, 43, 101, 183]. The fruit can also be dried for later use[257]. The fruit should only be eaten when it is fully ripe[55, 62, 95], the unripe fruit is strongly laxative[183]. Remove the rind[95]. The fruit is very aromatic[95], and has a peculiar though agreeable flavour[183]. Sweet and acid. Do not eat the seeds[62]. In excess the fruit can cause colic[22, 65, 159]. The fruit is about 5cm long[200].

tcanta InsecticideAn infusion of the boiled leaves has been sprayed on potato plants to protect them from insects[213]. Other reports suggest that it is insecticidal rather than repellent[238, 257]. The root ooze has been used to soak corn seed prior to planting it out in order to prevent it being eaten by crows or insects[257].

dwatta Antibilious Cancer Cathartic Cytostatic Homeopathy Hydrogogue Purgative Warts Women's complaints American mandrake is a most powerful and useful herbal medicine, exercising an influence on every part of the system and stimulating the glands to healthy action[4]. Its greatest power lies in its action on the liver and bowels[4]. It is a gastro-intestinal irritant, a powerful hepatic and intestinal stimulant[4]. Although often used internally in the past, the plant's cytotoxic action makes it an unsafe remedy for internal use[254]. The root is antibilious, cathartic, cytostatic, hydrogogue and purgative[4, 19, 46, 57, 64, 124, 222]. The plant contains podophyllin, which has an antimiotic effect (it interferes with cell division and can thus prevent the growth of cells). It is, therefore, a possible treatment for cancer, and has been used especially in the treatment of ovarian

cancer[46, 51, 57, 64, 65, 124, 244]. However, alopecia is said to be a common side-effect of this treatment[244]. The root is most active medicinally in early spring when it is beginning to shoot[4]. The resin, which is obtained from the root[207], is used in the treatment of warts and has been found to be effective against uterine warts that are sometimes experienced in pregnancy[200, 222]. It is also used in the treatment of small-cell carcinoma[207]. The root is harvested in the autumn and either dried for later use or the resin is extracted[238]. The whole plant, apart from the ripe fruit, is highly poisonous and should only be used under the supervision of a qualified practitioner[238]. It should not be prescribed for pregnant women[238]. Large doses have been used to commit suicide[213]. A homeopathic remedy is obtained from the fresh root, harvested before the fruit is ripe[232]. This is used particularly in the treatment of diarrhoea[232].

nrakta Eastern N. America - Southern Maine to Florida, west to Texas and Minnesota. ksacta Moist soils in rich woods, thickets and pastures[43, 130].

propta Seed - best sown as soon as it is ripe in a cold frame. Sow stored seed in a cold frame in early spring. The seed germinates in 1 - 4 months at 15°C. Prick out the seedlings into individual pots when they are large enough to handle and grow on in a shady part of the greenhouse for at least 2 growing seasons. Plant them out into their permanent positions in the winter when the plants are dormant. Division in March/April[111].

nwatta Landscape Uses:Ground cover, Woodland garden. Prefers a moist peaty soil and filtered light or shade[4, 111]. Grows well in a moist open woodland[28, 31] and also succeeds under beech trees in a deep moist leafy soil[130]. Succeeds in a pH ranging from 4 to 7[238]. A very hardy plant[4], tolerating temperatures down to -15°C or lower when dormant[187], though the young leaves in spring can be damaged by late frosts[233]. Plants in this genus have excited quite a lot of interest for the compounds found in their roots which have been shown to have anti-cancer activity[124]. There are various research projects under way (as of 1990)[124]. The flower has a foul smell[232]. The plant takes some years to become established[124] but is very long lived in a suitable habitat[130] and can become a vigorous colonizer[233]. Special Features: North American native, Naturalizing. The plant is heat tolerant in zones 8 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.217 *Elymus canadensis*

Canadian Wild Rye

3 tlin 7 cyuc 2 kcak 0 tcan 0 dwat 0.8 m hkuc
htut cyutli hgattcup hwicli hyishrasjlutnyik hpa7tli flatprikli-
wis hpa7tmwatli xre7t hjonli

drutta *Elymus canadensis* is a PERENNIAL growing to 0.8 m (2ft 7in) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to August, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil and can tolerate drought. The plant can tolerate maritime exposure.

ksakta Edible Parts: SeedEdible Uses: Seed - cooked[105, 161, 177]. It can be ground into a flour and used to make bread. Quite fiddly to use, the seed is small and difficult to separate[K]. The seed was an important item of food for the Paiute Indians of south-western N. America[183].

tcanta Soil stabilizationThe plant has an extensive root system and can be used for binding sand dunes[61].

nrakta N. America - in most areas except the far south. Recorded, but not yet naturalized in N. Europe[50] ksacta Dry sandy gravelly or rocky soil[43]. Thickets and open woods in limestone and sandy clay soils in Texas[274].

propta Seed - sow mid spring in situ and only just cover the seed[162]. Germination should take place within 2 weeks. If the supply of seed is limited, it can also be sown in mid spring in a cold frame. Only just cover the seed. When large enough to handle, prick the seedlings out into individual pots and plant them out in summer[K] Division in spring or summer[162]. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta An easily grown plant, it succeeds in most soils, preferring a sandy soil and a sunny position[1, 162]. Plants can flower too late to ripen their seed in Britain, especially in the western half of the country[K]. A polymorphic species[1].

4.2.218 *Ajuga reptans*

Bugle, Common Bugleweed, Bugleweed, Carpet Bugleweed, Carpetweed, Carpet Bugle
3 tlin 10 cyuc 2 kcak 2 tcan 3 dwat 0.3 m hkuc
pcimhmimhtut cyutli hgatyucctuphja7n hwicli hrasjlutnyik
hpa7tli flatprikliwis hpa7tmwatli fyifxre7t hjonli

drutta *Ajuga reptans* is an evergreen Perennial growing to 0.3 m (1ft) by 0.6 m (2ft in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf all year, in flower from May to July, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers dry moist or wet soil and can tolerate drought.

ksakta Edible Parts: LeavesEdible Uses: Young shoots - raw[7].

tcanta A good ground-cover for a position in semi-shade[200], forming a carpet and rooting as it spreads[208]. Fairly fast growing but it does not always smother out weeds and can become bare at the centre if not growing in good conditions[197]. Perennial groundcover for zone 2 firebreaks. The US government has created a system of firebreaks for areas prone to wildfires, these are separated into concentric zones surrounding buildings. Zone 2 is the second away from the house. These low-level groundcovers provide little fuel.

dwatta Aromatic Astringent Bitter HomeopathyBugle has a long history of use as a wound herb and, although little used today, it is still considered very useful in arresting haemorrhages and is also used in the treatment of coughs and spitting of blood in incipient consumption[4, 254, 268]. The plant contains digitalis-like substances (these are commonly found in *Digitalis* species and are used in treating heart complaints) and is thought to possess heart tonic properties[268]. It has also been considered good for the treatment of excessive alcohol intake[4]. The whole plant is aromatic, astringent and bitter[4, 7, 9]. The plant is usually applied externally[7]. It is harvested as it comes into flower in late spring and dried for later use[4, 7]. It is also commonly used fresh in ointments and medicated oils[238]. A homeopathic remedy is made from the whole plant. It is widely used in various preparations against throat irritations and especially in the treatment of mouth ulcers[7].

nrakta Most of Europe, including Britain, to S.W. Asia and N. Africa. ksacta Damp grassy fields and damp woods[7, 13, 17].

propta Seed - sow spring or autumn in a cold frame. The seed usually germinates in 3 - 4 weeks at 10°C[133], though it can be erratic[238]. Prick out the seedlings when they are

large enough to handle and plant them out in the summer[K]. Division of runners at almost any time of year. Very easy, the divisions can be planted straight out into their permanent positions if required.

nwatta Landscape Uses:Border, Container, Erosion control, Ground cover, Massing, Rock garden, Specimen, Woodland garden. Prefers a humus-rich, moisture retentive soil and partial shade[28, 31, 200]. Does well in marshy soil and in the spring meadow[24]. Grows well in dry shade[187, 190] and is fairly drought tolerant once established, though it shows distress in severe drought[190]. Plants do not always ripen their seeds in Britain, they spread freely by runners, however, and soon form an extensive patch in suitable conditions[4]. A number of forms have been selected for their ornamental value, several of them are variegated and these are used especially as ground cover plants for dry shade[187]. A purple-leaved form, 'Atropurpurea' does well in full sun so long as the soil is not dry[208]. A good bee and butterfly plant[24]. Special Features:Attractive foliage, Not North American native, Naturalizing. Heat Zone: 9-1.

4.2.219 *Prunella vulgaris*

Self-Heal, Common selfheal, Aleutian selfheal, Lance selfheal 3 tlin 7 cyuc 2 kcaok 0 tcan 3 dwat 0.2 m hkuc hmimhtut cyutli tcup hwicli hrasljutnyik hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

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

kcakta Edible Parts: LeavesEdible Uses: DrinkLeaves - raw or cooked[9]. They can be used in salads, soups, stews etc[183]. Somewhat bitter due to the presence of tannin in the leaves, though this can be removed by washing the leaves[177]. A cold water infusion of the freshly chopped or dried and powdered leaves is used as a refreshing beverage[161, 183]. Very tasty[168].

tcanta DyeAn olive-green dye is obtained from the flowers and stems[168]. The plant is a good ground-cover in sunny positions or light shade[200].

dwatta Alternative Antibacterial Antibiotic Antidiarrhoeal Antipyretic Antiseptic Antispasmodic Astringent Carminative Diuretic Febrifuge Hypotensive Stomachic Styptic Tonic Vermifuge VulnerarySelf heal has a long history of folk use, especially in the treatment of wounds, ulcers, sores etc[7]. It was also taken internally as a tea in the treatment of fevers, diarrhoea, sore mouth, internal bleeding etc[4, 222]. In Korea it is used to treat oedema, nephritis, scrofula and gonorrhoea[279]. The whole plant is alterative, antibacterial, antipyretic, antiseptic, antispasmodic, astringent, carminative, diuretic, febrifuge, hypotensive, stomachic, styptic, tonic, vermifuge and vulnerary[4, 9, 13, 21, 176, 218]. It has an antibacterial action, inhibiting the growth of *Pseudomonas*, *Bacillus typhi*, *E. coli*, *Mycobacterium tuberculosis* etc[176]. It can be used fresh or dried, for drying it is best harvested in mid-summer[4]. The plant is experimentally antibiotic and hypotensive[218, 222].

nrakta Europe, including Britain, from Norway south and east to N. Africa and temperate Asia. ksacta Waste ground, grassland, woodland edges etc, usually on basic and neutral soils[9, 17].

propta Seed - sow in mid spring in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. If you have sufficient seed then it can be sown outdoors in situ in mid to late spring. Division in spring or autumn. Very easy, larger divisions can be planted out direct into their permanent positions. We have found that it is better to pot up the smaller divisions and grow them on in light shade in a cold frame until they are well established before planting them out in late spring or early summer.

nwatta Thrives in any damp soil[1], in full sun or in light shade[238]. Plants are apt to become troublesome weeds in

turf that is at all damp[1]. Self heal is a good plant for growing in the spring meadow[24].

4.2.220 *Calochortus pulchellus*

Mount Diablo Globelily, Mt. diablo fairy-lantern 3 tlin 7 cyuc 2 kcaok 0 tcan 0 dwat 0.3 m hkuc hmimhtut cyutli kyuctcup hwicli hrasljut hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Calochortus pulchellus* is a BULB growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. 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) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: RootEdible Uses: Bulb - raw or cooked[46, 61, 105, 161, 257]. Rather small, usually smaller than a persons thumb, but easily harvested[207].

nrakta South-western N. America - California. ksacta Woody and brushy slopes in chaparral and pine and oak forest above 200 metres[71, 90].

propta Seed - sow as soon as ripe or early spring in a cold frame in a very sharply draining medium. Stratification may be helpful. Germination usually takes place within 1 - 6 months at 15°C[138]. Leave the seedlings undisturbed for their first two years growth[138], but give them an occasional liquid feed to ensure they do not become nutrient deficient. It is quite difficult to get the seedlings through their first period of dormancy since it is all too easy either to dry them out completely or keep them too moist when they will rot[214]. After their second year of growth, pot up the dormant bulbs in late summer and grow them on for at least another 2 years in the greenhouse before trying them outside. Seedlings take about 5 - 7 years to come into flower[214]. Division of the bulbs as soon as the foliage dies down. One report says that the bulbs must be planted into their permanent positions immediately[1], whilst another says that they can be stored overwinter and replanted in the spring[138]. Stem bulbils, harvested from the stems after flowering[200]. They can be stored cool and dry then planted in pots in the cold frame in the spring.

nwatta Requires a deep very well-drained fertile sandy soil in a warm sunny position and must be kept dry over winter[1, 200]. Another report says that it is best grown in a good, very gritty soil in sun or semi-shade in a bulb frame[90]. This is a rather difficult plant to cultivate in Britain, it is very cold hardy but is intolerant of wetness especially in the winter[1]. Another report says that the plant requires plenty of moisture when in growth, but very dry conditions after it has flowered[245]. It is easiest to grow in a bulb frame but this species is one of the least difficult of the genus[90] and is worth trying outdoors at the base of a south-facing wall, especially with shrubs that like these conditions[120]. Bulbs can be lifted as soon as the foliage dies down in the summer and stored overwinter in a cool dry place, replanting in spring[138]. Another report says that they should be replanted immediately[1]. Bulbs frequently divide after flowering, the bulblets taking 2 years to reach flowering size[200]. Hand pollination is necessary if seed is required[1]. The flowers are sweetly scented[245]. This species is closely related to *C. amabilis*[200].

4.2.221 *Bergenia crassifolia*

Siberian Tea 3 tlin 7 cyuc 2 kcaok 0 tcan 0 dwat 0.3 m hkuc pcmhmimhtut cyutli hgattcup hwicli hrasljutnyikfrp hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Bergenia crassifolia* is an evergreen Perennial growing to 0.3 m (1ft) by 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in leaf all year, in flower from March to April. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade

woodland) semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought.

kcakta Edible Parts: Edible Uses: TeaThe leaves are used as a tea substitute[2, 61, 105, 177, 183].

tcanta TanninA useful ground cover plant[188], though rather slow to spread[197]. It forms a clump[208]. Tannin is obtained from the bark[61]. The roots contain 15 - 22% tannin, exceptionally 26%[223]. The leaves and stems contain 17 - 25% tannin[223].

nrakta E. Asia - N.W. China to Siberia. **ksacta** On shady north-facing rocks, stony slopes, rock streams and old moraines in the forest and alpine zones[74].

propta Seed - surface sow in a greenhouse. Make sure that the compost does not dry out. Two weeks cold stratification can speed up germination which usually takes 1 - 6 months at 15°C[134]. Fresh seed, sown as soon as it is ripe in late spring is liable to germinate better than stored seed. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Division in late spring after flowering[188] or in autumn[200]. Very easy, larger divisions can be planted straight into their permanent positions whilst smaller clumps are best potted up and kept in a cold frame until they are growing away well.

nwata Succeeds in full sun or light shade in most soils[134, 200] but prefers a deep fertile soil that does not dry out fully[134]. Established plants are drought tolerant according to another report[190]. Grows well in heavy clay soils. Plants are at their best in a medium-heavy soil[208]. Requires a position sheltered from cold drying winds and from the early morning sun. The leaf colour is best when plants are grown in a poor soil in a sunny position[188]. A very ornamental plant, it is hardy to about -20°C[187]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. Plants seem to be immune to the predations of rabbits[233]. The different species of this genus will hybridise freely when grown near each other[233].

4.2.222 *Polypodium vulgare*

Polypody, Adders Fern, Golden Maidenhair Fern, Wall Fern, Common Polypod Fern

3 tlin 6 cyuc 2 kcaak 3 tcac 3 dwat 0.3 m hkuc
pcimhmim cyutli kyuctcup hwicli hyhshrasjlutnyikfrip hpa7tli
flatprikhwis hpa7tmwatli hjonli

drutta *Polypodium vulgare* is an evergreen Fern growing to 0.3 m (1ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf all year. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers dry or moist soil.

pcista Although we have found no reports of toxicity for this species, a number of ferns contain carcinogens so some caution is advisable[200]. Many ferns also contain thiaminase, an enzyme that robs the body of its vitamin B complex. In small quantities this enzyme will do no harm to people eating an adequate diet that is rich in vitamin B, though large quantities can cause severe health problems. The enzyme is destroyed by heat or thorough drying, so cooking the plant will remove the thiaminase[172].

kcakta Edible Parts: RootEdible Uses: Root. Very sweet, it contains sugars, tannin and oils[13]. It is used as a diquorice adulterant[7]. The root has a unique, rather unpleasant odour and a sweet (cloying) flavour at first though it quickly becomes nauseating[222]. The root contains 15.5% saccharose and 4.2% glucose[218].

tcanta Insecticide PotashPlants can be grown as a ground cover in a shady position[188, 200]. They form a spreading carpet and are best spaced about 30cm apart each way[208]. The ash of burnt leaves is rich in carbonate of potash[4].

dwatta Alterative Anthelmintic Cholagogue Demulcent Diuretic Expectorant Pectoral Purgative TonicPolypody stimulates bile secretion and is a gentle laxative. In European

herbal medicine it is traditionally used as a treatment for hepatitis and jaundice and as a remedy for indigestion and loss of appetite[254]. It should not be used externally since it can cause skin rashes[254]. The root is alterative, anthelmintic, cholagogue, demulcent, diuretic, expectorant, pectoral, purgative, tonic[4, 238, 240]. It can be used either fresh or dried and is best harvested in October or November, though it can be collected until February[4]. The leaves can also be used but are less active[4]. A tea made from the roots is used in the treatment of pleurisy, hives, sore throats and stomach aches and as a mild laxative for children[222]. It was also considered of value for lung ailments and liver diseases[222]. The poulticed root is applied to inflammations[222]. A tea or syrup of the whole plant is anthelmintic[222].

nrakta All of Europe, the Mediterranean, temperate Asia and eastern N. America. **ksacta** Rocks, walls and trees, as well as on the ground, in a variety of habitats[187] but especially in humid shady conditions[31].

propta Spores - best sown as soon as they are ripe, though they can also be sown in the spring. Sow them on the surface of a humus-rich sterilized soil. Keep the compost moist, preferably by putting a plastic bag over the pot. Pot on small clumps of plantlets as soon as they are large enough to handle and keep humid until they are well established. Do not plant outside until the ferns are at least 2 years old and then only in a very well sheltered position. Division. This is best done in the spring but it succeeds at most times of the year[1].

nwata Landscape Uses:Border, Container, Erosion control, Foundation, Ground cover, Massing, Rock garden, Woodland garden. Easily grown in most light soils[187]. Prefers a soil of leaf mould and a cool but not too moist clay[1]. Prefers a cool damp shady position[1]. Thrives in dry shade[28, 188]. Established plants are drought tolerant[208]. They grow well on drystone walls[200]. Plants often grow as epiphytes[28, 31]. Members of this genus are rarely if ever troubled by browsing deer[233]. A rather variable plant, it is considered to be an aggregate species of several very similar species[187]. Only the roots should be planted, the rhizome being fixed to the surface of the soil[1, 187]. Special Features: Attractive foliage, Not North American native, There are no flowers or blooms. *Polypodium virginianum* (*Polypodium vulgare* subsp. *virginianum* (L.) Hultén is a synonym of *Polypodium virginianum* L.) commonly known as rock cap fern, or common polypody tolerates hardness zones down to 3. It prefers acidic soil. It is a small evergreen species of fern native to the Eastern United States and Canada. It generally grows on rocks and occasionally on tree roots in nature. A small rhizomatous fern with narrow leaves 8-40 centimetres (3.1-15.7 in) long and 3-6 centimetres (1.2-2.4 in) wide. *Polypodium virginianum* typically grows on boulders, cliffs, and rocky slopes and does not need well-developed soil. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.223 *Calochortus aureus*

Mariposa Lily, Golden mariposa lily
3 tlin 7 cyuc 2 kcaak 0 tcac 0 dwat 0.3 m hkuc
htut cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikhwis
hpa7tmwatli xre7t hjonli

drutta *Calochortus aureus* is a BULB growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to June. The species is hermaphrodite (has both male and female organs) and is pol-

inated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: Flowers Root Edible Uses: Bulb - raw[44, 61, 105, 161]. The bulbs are gathered in early spring and peeled before being eaten[257]. Flowers[257]. No more details are given.

nrakta South-western N. America - Arizona, New Mexico and Utah. ksakta Dry sandy-clayey places at elevations of 1200 - 2000 metres[270]. Mesas, slopes and open pine forests in Arizona.

propta Seed - sow as soon as ripe or early spring in a cold frame in a very sharply draining medium. Stratification may be helpful. Germination usually takes place within 1 - 6 months at 15°C[138]. Leave the seedlings undisturbed for their first two years growth[138], but give them an occasional liquid feed to ensure they do not become nutrient deficient. It is quite difficult to get the seedlings through their first period of dormancy since it is all too easy either to dry them out completely or keep them too moist when they will rot[214]. After their second year of growth, pot up the dormant bulbs in late summer and grow them on for at least another 2 years in the greenhouse before trying them outside. Seedlings take about 5 - 7 years to come into flower[214]. Division of the bulbs as soon as the foliage dies down. One report says that the bulbs must be planted into their permanent positions immediately[1], whilst another says that they can be stored overwinter and replanted in the spring[138]. Stem bulbils, harvested from the stems after flowering[200]. They can be stored cool and dry then planted in pots in the cold frame in the spring.

nwatta Requires a deep very well-drained fertile sandy soil in a sunny position and must be kept dry over winter[1, 200]. This is a rather difficult plant to cultivate in Britain, it is very cold hardy but is intolerant of wetness especially in the winter. It is easiest to grow in a bulb frame but is worth trying outdoors at the base of a south-facing wall, especially with shrubs that like these conditions[120]. Bulbs can be lifted as soon as the foliage dies down in the summer and stored overwinter in a cool dry place, replanting in spring[138]. Bulbs frequently divide after flowering, the bulbils taking 2 years to reach flowering size[200]. Hand pollination is necessary if seed is required[1].

4.2.224 *Mentha x piperita citrata*

Eau De Cologne Mint, Eau de Cologne Mint, Peppermint
3 tlin 9 cyuc 2 kcaak 3 tcan 2 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfril hpa7tli flatprik-
lwis hpa7tmwatli xre7t hjonli

drutta *Mentha x piperita citrata* 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 3 and is not frost tender. It is in flower from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no specific mention has been seen for this sub-species, it should be noted that, in large quantities, the closely allied *M. x piperita vulgaris* can cause abortions, especially when used in the form of the extracted essential oil, so it should not be used by pregnant women.

kcakta Edible Parts: Leaves Edible Uses: Condiment Tea Leaves - raw or cooked. Used as a flavouring in salads or cooked foods[5]. A very pungent flavour, the leaves of the true eau-de-cologne mint are too aromatic for most tastes, though the cultivar 'Basil' has an excellent flavour and makes a very good substitute for basil in pesto[K]. A herb tea is made from the fresh or dried leaves[21, 183].

tcanta Essential Repellent Strewing Landscape Uses: Container, Ground cover, Woodland garden. An essential oil obtained from the whole plant is a source of lavender oil which is used in perfumery[46, 105, 238]. It is also used in oral hygiene preparations, toiletries etc[238]. Formerly used as a strewing herb[14], the plant repels insects, rats etc[14, 18, 20]. Rats and mice intensely dislike the smell of mint. The plant was therefore used in homes as a strewing herb

and has also been spread in granaries to keep the rodents off the grain[244]. Dynamic accumulator.

dwatta Anodyne Antiseptic Antispasmodic Carminative Cholagogue Diaphoretic Refrigerant Stomachic Tonic Vasodilator Eau de Cologne mint, like many other members of this genus, is often used as a domestic herbal remedy, being valued especially for its antiseptic properties and its beneficial effect on the digestion. Like other members of the genus, it is best not used by pregnant women because large doses can cause an abortion. The leaves and flowering plant are anodyne, antiseptic, antispasmodic, carminative, cholagogue, diaphoretic, refrigerant, stomachic, tonic, vasodilator[4, 9, 21, 165]. A tea made from the leaves has traditionally been used in the treatment of fevers, headaches, digestive disorders and various minor ailments[222]. The medicinal uses of this herb are more akin to lavender (*Lavandula* spp) than the mints. It is used to treat infertility, rapid heartbeat, nervous exhaustion etc[238]. The leaves are harvested as the plant comes into flower and can be dried for later use[238]. The essential oil in the leaves is antiseptic, though it is toxic in large doses[222].

nrakta Britain. ksakta A natural hybrid, *M. aquatica* x *M. spicata* found in moist soils on the sides of ditches, roadsides etc in S. England[5, 17].

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

nwatta A very easily grown plant, it succeeds in most soils and situations so long as the soil is not too dry[1, 200]. Grows well in heavy clay soils. A sunny position is best for the production of essential oils, but the plant also succeeds in partial shade. Prefers a slightly acid soil[16]. Plants are very tolerant of neglect, succeeding in long grass[K]. Hybridizes freely with other members of this genus. Most mints have fairly aggressive spreading roots and, unless you have the space to let them roam, they need to be restrained by some means such as planting them in containers that are buried in the soil[K]. The flowers are very attractive to bees and butterflies[24]. A good companion for growing near cabbages and tomatoes, helping to keep them free of insect pests[14, 20]. The mint will need to be grown in containers to prevent it spreading too aggressively into the other plants. The whole plant has a strong minty aroma with a hint of ginger[245]. The plant produces a better quality essential oil if the plant is grown in dry ground[115]. Members of this genus are rarely if ever troubled by browsing deer[233]. Special Features: Attractive foliage, Edible, Fragrant foliage, Not North American native, Invasive, Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is rhizomatous with underground stems sending roots and shoots along their length[2-1].

4.2.225 *Equisetum arvense*

Field Horsetail
3 tlin 11 cyuc 2 kcaak 4 tcan 3 dwat 0.6 m hkuc
hmimhtut cyutli kyuctcup hwicli hyishrasjlutnyik hpa7tli flat-
prik-lwis hpa7tmwatli hjonli

drutta *Equisetum arvense* is a PERENNIAL growing to 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 3. The seeds ripen in April. Suitable for: light (sandy),

(medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

pcista Large quantities of the plant can be toxic. This is because it contains the enzyme thiaminase[172], a substance that can rob the body of the vitamin B complex[65]. In small quantities this enzyme will do no harm to people eating an adequate diet that is rich in vitamin B, though large quantities can cause severe health problems. The enzyme is destroyed by heat or thorough drying, so cooking the plant will remove the thiaminase[172]. The plant also contains equisetin - see the notes on medicinal uses for more information[213]. Avoid in patients with oedema due to heart failure or impaired kidney function [301].

kcakta Edible Parts: Root StemEdible Uses: Strobil (the fertile shoots in spring) - cooked and used as an asparagus substitute[7, 46, 61, 94]. They should be used when young[116] but even so it is probably best to change the water, perhaps 3 - 4 times[85, 102]. One report says that they can be eaten raw[172], they are peeled and the shoot tip is discarded[213]. It is said to be a very tedious operation and they should not be eaten raw in any quantity, see the notes above on toxicity[K]. Some native tribes liked to eat the young vegetative shoots, picked before they had branched out, and would often collect them in great quantity then hold a feast to eat them[257]. The leaf sheaths were peeled off and the stems eaten raw - they were said to be 'nothing but juice'[257]. Roots - raw[61]. The tuberous growths on the rhizomes are used in the spring[172]. The black nodules attached to the roots are edible[257]. It takes considerable effort to collect these nodules so it is normally only done in times of desperation. However, native peoples would sometimes raid the underground caches of roots collected by lemmings and other rodents in order to obtain these nodules[257]. A further report says that the peeled stems, base of the plant, root and tubers were eaten raw by the N. American Indians, the report went on to say that this may be inadvisable[85].

tcanta Dye Fungicide Liquid feed Musical Paper Polish Sandpaper ScourerThe stems contain 10% silica and are used for scouring metal[4, 7, 20, 94, 102] and as a fine sandpaper[7, 54, 99, 257]. They can also be used as a polish for brass, hardwood etc[94]. The infused stem is an effective fungicide against mildew, mint rust and blackspot on roses[14, 18, 20, 54]. It also makes a good liquid feed[54]. A light pink dye is obtained from the stem[99, 257]. It is yellow-gray according to another report[102]. The plant has been used for making whistles[257].

dwatta Anodyne Antirheumatic Antiseptic Astringent Cardiac Carminative Diaphoretic Diuretic Eczema Galactogogue Haemostatic Homeopathy Nervine TB Urinary VulneraryHorsetails have an unusual chemistry compared to most other plants[238]. They are rich in silica, contain several alkaloids (including nicotine) and various minerals[238]. Horsetail is very astringent and makes an excellent clotting agent, staunching wounds, stopping nosebleeds and reducing the coughing up of blood[254]. It helps speed the repair of damaged connective tissue, improving its strength and elasticity[254]. The plant is anodyne, antihemorrhagic, antiseptic, astringent, carminative, diaphoretic, diuretic, galactogogue, haemostatic and vulnerary[4, 7, 9, 20, 21, 46, 61, 165, 172, 218, 240]. The green infertile stems are used, they are most active when fresh but can also be harvested in late summer and dried for later use[4, 9]. Sometimes the ashes of the plant are used[4]. The plant is a useful diuretic when taken internally and is used in the treatment of kidney and bladder problems, cystitis, urethritis, prostate disease and internal bleeding, proving especially useful when there is bleeding in the urinary tract[4, 238, 254]. A decoction applied externally will stop the bleeding of wounds and promote healing[4]. It is especially effective on nose bleeds[7]. A decoction of the herb added to a bath benefits slow-healing sprains and fractures, as well as certain irritable skin conditions such as eczema[254]. The plant contains equisetin acid, which is thought to be identical to acetic acid. This substance is a potent heart and nerve sedative that is a dangerous poison when taken in high doses[213]. This plant contains irritant substances and should only be used for short periods of time[238]. It is also best only used under the supervision of a qualified practitioner. A homeopathic remedy is made from the fresh plant[7]. It is used

in the treatment of cystitis and other complaints of the urinary system[7]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve Equisetum arvense for urinary tract infections, kidney and bladder stones, wounds and burns (see [302] for critics of commission E).

nrakta Arctic and temperate regions of Europe, including Britain, N. America and Asia. ksacta Open fields, arable land, waste places, hedgerows and roadsides[9], usually on moist soils[4].

propta Spores - best collected as soon as they are ripe in the spring and surface-sown immediately on a sterile compost. Keep moist and pot up as soon as the plants are large enough to handle. Very difficult[200]. Division. The plants usually spread very freely when well sited and should not really need any assistance.

nwatta Prefers poor dusty ground[53, 54]. This rather contradicts another report which says that the presence of this plant indicates underground water[4]. Prefers a moist but well-drained fertile soil with a pH between 6.5 and 7.5[200, 238]. A very cold-hardy species tolerating temperatures down to about -30°C[200]. Plants have a deep and penetrating root system and can be invasive. If grown in the garden they are best kept in bounds by planting them in a large container which can be sunk into the ground[200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fleshy. Thick or swollen - fibrous or tap root [2-1].

4.2.226 Clintonia borealis

Bluebeard

3 tlin 7 cyuc 2 kcak 2 tcant 1 dwat 0.3 m hkuc pcmhimhm cyutli tcup hwicli hrasljut hpa7tli frusflatprik hpa7tmwatli xre7t hjonli

drutta Clintonia borealis is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardness. It is hardy to UK zone 3 and is not frost tender. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: LeavesEdible Uses: Young leaves - raw or cooked[61, 105, 177]. Harvested in spring before they fully unfurl[62], they have a slightly sweetish cucumber flavour[55, 183]. Older leaves can be used as a potherb[55].

tcanta Disinfectant RepellentThe crushed leaves have been rubbed on the face and hands as a protection from mosquitoes[257].

dwatta Cardiac Disinfectant PoulticeThe leaves are cardiac and disinfectant[257]. A poultice has been applied to open wounds, burns, ulcers, scrofulous sores and infections[257].

nrakta North-eastern N. America - Newfoundland to Manitoba, south to N. Carolina and Wisconsin. ksacta Rich woodlands, deep thickets, higher elevations in cool moist sites[43, 62].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the spring[200]. Stored seed should be sown in late winter or early spring in a cold frame[164]. It sometimes germinates within 1 - 3 months at 15°C, but may take a year. The seed should be completely separated from the fruit and should only just be covered by soil[164, 200]. If the seed has been sown thinly enough, then it is possible to leave the seedlings in the pot for their first growing season, dividing them after they become dormant. Make sure to give them liquid feeds at intervals through the spring and summer. Otherwise prick out the seedlings into individual pots when they are large enough to handle. Plant out in late spring or early summer at the beginning of their second or third years growth. Division in spring as new growth is just commencing[200].

nwatta Prefers a damp peaty sandy soil in a cool damp shady position[1, 42, 200]. Requires a moist neutral to acid soil[200]. The dormant plant is hardy to at least -25°C, but new growth in spring can be damaged by late frosts[187]. Plants only produce their fruit in warm seasons in Britain[200]. They have creeping underground stems and

form dense colonies[187]. This species is closely related to *C. andrewsiana*[188]. 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].

4.2.227 *Achillea ptarmica*

Sneeze-Wort, Sneezeweed

3 tlin 9 cyuc 2 kcaak 2 tcan 1 dwat 0.6 m hkuc
hptu cyuti tcup hwicli hyishrasjlutnyik hpa7tli flatprikliw
hpa7tmwatli fyifxre7t hjonli

drutta Achillea ptarmica is a PERENNIAL growing to 0.6 m (2ft) by 0.6 m (2ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil. The plant can tolerate maritime exposure.

kcakta Edible Parts: LeavesEdible Uses: Leaves - raw or cooked[17, 105, 177]. Used as a flavouring in salads[172].

tcanta Essential Hair Miscellany RepellentThe dried, powdered leaves are used as a sneezing powder[61, 100]. Yields an essential oil that is used medicinally[100]. The report does not say what part of the plant the oil is obtained from, it is most likely to be the leaves harvested just before flowering[K]. The leaves are used as an insect repellent[172].

dwatta Antidiarrhoeal Antiemetic Antiflatulent Antirheumatic Appetizer Cardiac Diaphoretic Digestive Emmenagogue Miscellany Odontalgic Sternutatory StypticCardiac, diaphoretic, digestive, emmenagogue, odontalgic, sternutatory, styptic[46, 172]. The leaf is chewed to relieve toothache[207].

nrakta Europe, including Britain but excluding the Mediterranean, east to Siberia and W. Asia. ksacta Damp meadows, marshes and by streams[17].

propta Seed - sow spring or early autumn in a cold frame[133]. The seed usually germinates in 1 - 3 months[133]. When large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. Division in spring or autumn. Very easy, the divisions can be planted direct into their permanent positions. Basal cuttings of new shoots in spring. Very easy, collect the shoots when they are about 10cm tall, potting them up individually in pots and keeping them in a warm but lightly shaded position. They should root within 3 weeks and will be ready to plant out in the summer.

nwatta Landscape Uses:Border, Container, Rock garden, Seashore, Specimen. Succeeds in most soils but prefers a moist well-drained soil in a sunny position[1, 187]. Plants also succeed in partial shade[187]. Plants succeed in maritime gardens[233]. They live longer when growing in a poor soil[200]. The plant has a spreading root system and can be very invasive[233]. Hardy to at least -25°C[187]. There are some named varieties, selected for their ornamental value[233]. Hybridizes freely with other members of this genus[200]. Special Features:Not North American native, Invasive, Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of

"heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.228 *Geum canadense*

White Avens, Texan avens

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat 0.8 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatprikliw
hpa7tmwatli xre7t hjonli

drutta Geum canadense is a PERENNIAL growing to 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Edible Uses: ChocolateThe boiled roots are a chocolate substitute[183]. The roots are also gathered in spring before the plant comes into growth and are used as a flavouring and preservative in ale[207].

nrakta Eastern N. America - Nova Scotia to Ontario, Georgia, Minnesota and Kansas. ksacta Rich thickets and borders of woods in various soils[204, 274].

propta Seed - sow spring or autumn in a cold frame[200]. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. Division in spring or autumn. This should be done every 3 - 4 years in order to maintain the vigour of the plant[200]. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Easily grown in any moderately good garden soil that is well-drained[1]. Prefers a soil rich in organic matter[200]. Plants are hardy to at least -15°C[200]. Hybridizes freely with other members of this genus[200].

4.2.229 *Clintonia udensis*

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat 0.3 m hkuc
pcimhmim cyutli tcup hwicli hrasjlut hpa7tli frusflatprik
hpa7tmwatli xre7t hjonli

drutta Clintonia udensis is a PERENNIAL growing to 0.3 m (1ft) by 0.6 m (2ft in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid and neutral soils and can grow in very acid soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers moist soil.

kcakta Edible Parts: LeavesEdible Uses: Young leaves and shoots - cooked as a vegetable[177, 272].

nrakta E. Asia - Himalayas to S.W. China. ksacta Birch forests and alpine shrubberies, 3000 - 4000 metres from Uttar Pradesh to China[51]. Sparse forests, alpine forests at elevations of 1600 - 4000 metres[266].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the spring[200]. Stored seed should be sown in late winter or early spring in a cold frame[164]. It sometimes germinates within 1 - 3 months at 15°C, but may take a year. The seed should be completely separated from the fruit and should only just be covered by soil[164, 200]. If the seed has been sown thinly enough, then it is possible to leave the seedlings in the pot for their first growing season, dividing them after they become dormant. Make sure to give them liquid feeds at intervals through

the spring and summer. Otherwise prick the seedlings into individual pots when they are large enough to handle. Plant out in late spring or early summer at the beginning of their second or third years growth. Division in spring as new growth is just commencing[200].

nwatta Prefers a damp peaty sandy soil in a cool damp shady position[1, 42, 200]. Requires a moist neutral to acid soil[200]. Dormant plants are hardy to at least -25°C, but the new growth in spring can be damaged by late frosts[187]. Plants only produce their fruit in warm seasons in Britain[200].

4.2.230 *Vaccinium scoparium*

Grouseberry, Grouse whortleberry

3 tlin 7 cyuc 2 kcaak 0 tcan 1 dwat 0.2 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlut hpa7tli frusflat
hpa7tmwatli xre7t hjonli

drutta *Vaccinium scoparium* is a deciduous Shrub growing to 0.2 m (0ft 8in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: FruitEdible Uses: TeaFruit - raw or cooked and used in pies, jellies, jams, breads, muffins etc[60, 85, 161, 183, 257]. The dried fruits can be used to flavour other foods or to thicken soups[183]. The fruit is about 4 - 6mm in diameter[200]. The fresh or dried leaves can be used to make a kind of tea.

tcanta BroomThe branches can be used as brooms[257].

dwatta Antiemetic Antiseptic Appetizer Astringent Carminative HypoglycaemicAntiseptic, astringent, carminative, hypoglycaemic[172]. An infusion of the dried, pulverized leaves has been used in the treatment of nausea and to increase the appetite[257]. The dried and powdered fruits have been given to children to improve their appetite[257].

nrakta Western N. America - British Columbia and Alberta, south to Colorado and S. Dakota. ksacta Usually found at high elevations[60].

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]. Dislikes root disturbance, plants are best grown in pots until being planted out in their permanent positions[200]. Plants in this genus are notably resistant to honey fungus[200].

4.2.231 *Calochortus tolmiei*

Tolmie Startulip

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat 0.3 m hkuc
hmmihmtut cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikliw
hpa7tmwatli xre7t hjonli

drutta *Calochortus tolmiei* is a BULB growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH:

mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: RootEdible Uses: Bulb - raw or cooked[105, 161, 177]. A sweet flavour, it can be baked or boiled like potatoes[257].

nrakta Western N. America - Washington to California. ksacta Dry, usually rocky, soils on brushy slopes[60]. Open stony places in montane coniferous forests, 1000 - 2200 metres[90].

propta Seed - sow as soon as ripe or early spring in a cold frame in a very sharply draining medium. Stratification may be helpful. Germination usually takes place within 1 - 6 months at 15°C[138]. Leave the seedlings undisturbed for their first two years growth[138], but give them an occasional liquid feed to ensure they do not become nutrient deficient. It is quite difficult to get the seedlings through their first period of dormancy since it is all too easy either to dry them out completely or keep them too moist when they will rot[214]. After their second year of growth, pot up the dormant bulbs in late summer and grow them on for at least another 2 years in the greenhouse before trying them outside. Seedlings take about 5 - 7 years to come into flower[214]. Division of the bulbs as soon as the foliage dies down. One report says that the bulbs must be planted into their permanent positions immediately[1], whilst another says that they can be stored overwinter and replanted in the spring[138]. Stem bulbils, harvested from the stems after flowering[200]. They can be stored cool and dry then planted in pots in the cold frame in the spring.

nwatta Requires a deep very well-drained fertile sandy soil in a sunny position and must be kept dry over winter[1, 200]. Another report says that it is best grown in a good, very gritty soil in sun or semi-shade in a bulb frame[90]. This is a rather difficult plant to cultivate in Britain, it is very cold hardy but is intolerant of wetness especially in the winter[1, 200]. It is easiest to grow in a bulb frame but is worth trying outdoors at the base of a south-facing wall, especially with shrubs that like these conditions[120]. Bulbs can be lifted as soon as the foliage dies down in the summer and stored overwinter in a cool dry place, replanting in spring[138]. Another report says that they should be replanted immediately[1]. Bulbs frequently divide after flowering, the bulblets taking 2 years to reach flowering size[200]. Hand pollination is necessary if seed is required[1].

4.2.232 *Lewisia pygmaea*

Pigmy Bitterroot, Alpine lewisia

3 tlin 7 cyuc 2 kcaak 0 tcan 0 dwat 0.1 m hkuc
htut cyutli tcup hwicli hrasjlut hpa7tli flatprik hpa7tmwatli
xre7t hjonli

drutta *Lewisia pygmaea* is a PERENNIAL growing to 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in leaf from September to July. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: RootEdible Uses: Root - cooked. Steeped and boiled[177]. It can also be dried for later use[257]. The root is said to be extremely nutritious[85], though some native North American Indian tribes believed that eating it could cause insanity[257]. It is easiest to use when the plant is in flower because the outer layer of the root (which is very bitter) slips off easily at this time of the year[85]. The root has a good taste though a decided bitter flavour develops afterwards[105, 161].

nrakta Western N. America - British Columbia to California, Arizona and New Mexico. ksacta Open, often gravelly, moist to dryish areas in mountains to above the tree line[60]. Open places in short turf or gravelly or rocky substrates at elevations of 2300 - 4200 metres[270].

propta Seed - best sown as soon as it is ripe in a cold frame in a very freely draining soil[129]. Sow stored seed as soon as possible in a cold frame. One months cold stratification should improve germination, though this is still likely to be very slow. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first two winters. Plant them out

into their permanent positions in late spring or early summer, after the last expected frosts. Division in March/April. Very difficult.

nwatta Requires a very well-drained gritty humus-rich deep soil in a sunny position[1, 200]. Prefers a neutral to acid soil[188]. This species is not reliably hardy in Britain. It can withstand consistently very cold weather but does not like alternating periods of mild and cold conditions, nor does it like winter wet[1]. The plant is very susceptible to rotting at the neck in a damp soil[200]. Plants die down after flowering and start growing again in the autumn[188]. A very ornamental plant[1]. Polymorphic[60]. Very apt to hybridize with other members of this genus[1].

4.2.233 *Lilium cernuum*

3 tlin 7 cyuc 2 kcaok 0 tcan 0 dwat 0.6 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlut hpa7tli flatpriklwis
hpa7tmwatli xre7t hjonli

drutta *Lilium cernuum* is a BULB growing to 0.6 m (2ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 3. 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 Bees. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Root Edible Uses: Bulb - cooked[105, 177]. The bulb is up to 4cm in diameter[266]. Rich in starch, it can be used as a vegetable in similar ways to potatoes (*Solanum tuberosum*).

nrakta E. Asia - Korea, Manchuria. **ksakta** Exposed positions amongst grass and shrubs on alluvial soils and amongst slate rocks[143].

propta Seed - immediate epigeal germination[130]. Sow thinly in pots from late winter to early spring in a cold frame. Should germinate in 2 - 4 weeks[163]. Great care should be taken in pricking out the young seedlings, many people prefer to leave them in the seed pot until they die down at the end of their second years growth. This necessitates sowing the seed thinly and using a reasonably fertile sowing medium. The plants will also require regular feeding when in growth. Divide the young bulbs when they are dormant, putting 2 - 3 in each pot, and grow them on for at least another year before planting them out into their permanent positions when the plants are dormant[K]. Division with care in the autumn once the leaves have died down. Replant immediately[200]. Bulb scales can be removed from the bulbs in early autumn. If they are kept in a warm dark place in a bag of moist peat, they will produce bulblets. These bulblets can be potted up and grown on in the greenhouse until they are large enough to plant out[200].

nwatta Prefers an open free-draining humus-rich loamy soil with its roots in the shade and its head in the sun[200]. Lime tolerant[200]. Stem rooting, the bulbs should be planted 10 - 12cm deep[143]. Early to mid autumn is the best time to plant out the bulbs in cool temperate areas, in warmer areas they can be planted out as late as late autumn[200]. Closely allied to *L. pumilum*[143]. The plants are short lived in cultivation. The plant is well suited to growing at the foot of a rock garden[143]. The flowers are sweetly scented[245]. The plant should be protected against rabbits and slugs in early spring. If the shoot tip is eaten out the bulb will not grow in that year and will lose vigour[200].

4.2.234 *Hypericum perforatum*

St. John's Wort, Common St. Johnswort

3 tlin 7 cyuc 2 kcaok 2 tcan 4 dwat 0.9 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyik hpa7tli flatpriklwis
hpa7tmwatli fyifxre7t hjonli

drutta *Hypericum perforatum* is a PERENNIAL growing to 0.9 m (3ft) by 0.6 m (2ft in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils

and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Skin contact with the sap, or ingestion of the plant, can cause photosensitivity in some people[13, 76, 222]. Common side-effects are gastrointestinal disturbances, allergic reactions and fatigue. If used with drugs classed as serotonin reuptake inhibitors (fluoxetine:Prozac, paroxetine: Paxil) symptoms of serotonin syndrome may occur: mental confusion, hallucinations, agitation, headache, coma, shivering, sweating, fever, hypertension, tachycardia, nausea, diarrhoea, tremors. St John's wort can reduce the effectiveness of prescription medicine inc: contraceptive pill, antidepressants, immune suppressants, HIV medications, warfarin, digoxin [301].

kcakta Edible Parts: Edible Uses: Tea The herb and the fruit are sometimes used as a tea substitute[7, 183]. The flowers can be used in making mead[183].

tcanta Dye Tannin Yellow, gold and brown dyes are obtained from the flowers and leaves[168]. A red is obtained from the flowers after acidification[141]. A red dye is obtained from the whole plant when infused in oil or alcohol[7, 61, 115]. A yellow is obtained when it is infused in water[7, 74, 115]. The plant is said to contain good quantities of tannin, though exact figures are not available[223].

dwatta Analgesic Antidepressant Antiseptic Antispasmodic Aromatic Astringent Cholagogue Digestive Diuretic Expectorant Homeopathy Nerve Resolvent Sedative Stimulant Vermifuge Vulnerary St. John's wort has a long history of herbal use. It fell out of favour in the nineteenth century but recent research has brought it back to prominence as an extremely valuable remedy for nervous problems[254]. In clinical trials about 67% of patients with mild to moderate depression improved when taking this plant[254]. The flowers and leaves are analgesic, antiseptic, antispasmodic, aromatic, astringent, cholagogue, digestive, diuretic, expectorant, nerve, resolvent, sedative, stimulant, vermifuge and vulnerary[4, 9, 13, 21, 165, 218, 222]. The herb is used in treating a wide range of disorders, including pulmonary complaints, bladder problems, diarrhoea and nervous depression[4]. It is also very effectual in treating overnight incontinence of urine in children[4]. Externally, it is used in poultices to dispel herd tumours, caked breasts, bruising etc[4]. The flowering shoots are harvested in early summer and dried for later use[7]. Use the plant with caution and do not prescribe it for patients with chronic depression[238]. The plant was used to procure an abortion by some native North Americans, so it is best not used by pregnant women[257]. See also the notes above on toxicity[21, 222]. A tea or tincture of the fresh flowers is a popular treatment for external ulcers, burns, wounds (especially those with severed nerve tissue), sores, bruises, cramps etc[222, 238]. An infusion of the flowers in olive oil is applied externally to wounds, sores, ulcers, swellings, rheumatism etc[240]. It is also valued in the treatment of sunburn and as a cosmetic preparation to the skin[240]. The plant contains many biologically active compounds including rutin, pectin, choline, sitosterol, hypericin and pseudohypericin[222]. These last two compounds have been shown to have potent anti-retroviral activity without serious side effects and they are being researched in the treatment of AIDS[222, 238]. A homeopathic remedy is made from the fresh whole flowering plant[232]. It is used in the treatment of injuries, bites, stings etc and is said to be the first remedy to consider when nerve-rich areas such as the spine, eyes, fingers etc are injured[232].

nrakta Europe, including Britain, south and east to N. Africa, the Azores, Madeira and W. Asia. **ksakta** Open woods, hedgebanks and grassland, in dry sunny places, usually on calcareous soils[7, 17].

propta Seed - sow in a greenhouse as soon as it is ripe in the autumn or in the spring. It normally germinates in 1 - 3 months at 10°C. Prick out the seedlings into individual pots when they are large enough to handle and plant them out into their permanent positions in the summer. Division in spring or autumn[111, 238]. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Easily grown in any reasonably good well-drained but moisture retentive soil[1]. Succeeds in dry soils[238]. Plants grow well in sun or semi-shade but they

flower better when in a sunny position[200]. St. John's wort is often found as a weed in the garden[1]. It grows well in the summer meadow and is a useful plant for attracting insects[24]. The whole plant, especially when in bloom, gives off a most unpleasant smell when handled[245]. *Hypericum perforatum* is apparently an allotetraploid that would appear to have arisen from a cross between two diploid taxa, viz. *H. maculatum* subsp. *maculatum* (Europe to western Siberia) and *H. attenuatum* (western Siberia to China)[266]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [2-1].

4.2.235 *Aquilegia formosa truncata*

Columbine
3 tlin 7 cyuc 2 kcaok 0 tcan 2 dwat 0.9 m hkuc
hmmimhtut cyutli tcup hwicli hrasjlut hpa7tli flatprikhwis
hpa7tmwatli xre7t hjonli

drutta *Aquilegia formosa truncata* is a PERENNIAL growing to 0.9 m (3ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from May to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

pcista Although no records of toxicity have been seen for this species, it belongs to a family that contains a number of mildly toxic species. It is therefore wise to exercise some caution. The flowers are probably perfectly safe to eat.

kcaakta Edible Parts: FlowersEdible Uses: Flowers - raw. Rich in nectar, they are sweet and delightful[172, 213], they make a very attractive addition to mixed salads and can also be used as a thirst-quenching munch in the garden[K]. Children enjoy sucking out the sweet nectar from the base of the flowers[257]. Early spring greens cooked and eaten as a vegetable[257]. Some caution is advised, see the notes above on toxicity. Root - cooked. Used by the N. American Indians as a famine food[213]. Some caution is advised, see the notes above on toxicity.

tcanta Parasiticide ParasiticideThe seed is used to rid the hair of lice[172, 257]. The whole plant is boiled up and used as a hair wash[213, 257]. The seeds are aromatic. They can be crushed and rubbed on the body as a perfume or placed in a sachet and stored with clothes to impart a nice smell[257].

dwatta Antispasmodic Diaphoretic Parasiticide Parasiticide Resolvent SalveWestern columbine was quite frequently employed by a number of native North American Indian tribes who used it to treat a variety of complaints[257]. It is little used in modern herbalism. Antispasmodic, diaphoretic, parasiticide, resolvent, salve[172]. A decoction of the root is used in the treatment of diarrhoea and stomach aches[257]. A decoction of the roots and leaves is used in the treatment of VD, dizziness and biliousness[257]. The mashed fresh roots can be rubbed briskly on aching rheumatic joints[257]. A poultice of chewed roots or leaves is applied to bee stings, sores etc[257]. A decoction of the leaves is used in the treatment of sore throats, coughs and colds[257]. The seeds can be chewed as a remedy for stomach aches[257].

nrakta South-western N. America - California, Nevada and Oregon. Ksacta Mesic woods or shrublands from sea level to about 3500 metres[270].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be slow to germinate[200]. Stored seed can be sown in late winter in a cold frame. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for their first winter. Plant out in late spring or early summer. Division in spring[200].

nwatta Succeeds in ordinary garden soil, preferring a moist but not wet soil and a sunny position[1]. Intolerant of heavy clay[200]. A very ornamental plant[1], it is hardy to about -15°C[187]. Most species are short-lived, dying out after 2 - 3 years, though they usually produce seed prolifically[200]. However, they are very apt to hybridize with other members of the genus and so it becomes difficult to

keep a species true to type if more than one is grown in the garden[200]. Plants seem to be immune to the predations of rabbits[233]. A greedy plant, inhibiting the growth of nearby plants, especially legumes[54].

4.2.236 *Empetrum eamesii hermaphroditum*

Mountain Crowberry, Rockberry
3 tlin 8 cyuc 2 kcaok 0 tcan 0 dwat 0.3 m hkuc
htut cyutli tcup hwicli hrasjlutnyik hpa7tli frusflatprikhwis
hpa7tmwatli fyixre7t hjonli

drutta *Empetrum eamesii hermaphroditum* is an evergreen Shrub growing to 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in leaf all year, in flower in March. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils 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 soil. The plant can tolerate strong winds but not maritime exposure.

kcaakta Edible Parts: FruitEdible Uses: TeaFruit - raw or cooked[61]. A watery flavour, it is mainly used for making drinks, pies, preserves etc[183]. The Inuit dry or freeze them for winter use[183]. The fruit is about 4mm in diameter[200]. A tea can be made from the twigs[183].

tcanta Plants can be used for groundcover in exposed locations[200].

nrakta Northern Europe, including Britain, mountains in southern Europe, Greenland, Canada and Siberia. ksacta On mountain tops and moors, mostly at high altitudes but down to sea level in the far north of its range[17].

propta Seed - best sown as soon as it is ripe in a cold frame. The seed can be very slow to germinate, stored seed requires 5 months warm then 3 months cold stratification at 5°C[200]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Cuttings of half-ripe wood, 3cm with a heel, July/August in a frame. Takes 3 weeks. Good percentage[78, 200]. Cuttings of mature wood of the current year's growth, 3cm with a heel, October in a frame. Requires shade. Good percentage[78, 200].

nwatta Landscape Uses:Erosion control, Foundation, Ground cover, Massing, Rock garden. A calcifuge plant, it is easily grown in a moist lime-free peaty soil[11, 182, 200]. Unlike most members of this genus, this species is hermaphrodite and self-fertile[183]. There has been some confusion over the name of this plant. Some authorities refer to it as *E. hermaphroditum* and others include it in *E. nigrum* or *E. eamesii*[200]. Special Features: Attractive foliage, North American native, Inconspicuous flowers or blooms.

4.2.237 *Hosta ventricosa*

Blue plantain lily, Hosta
3 tlin 9 cyuc 2 kcaok 0 tcan 1 dwat 0.6 m hkuc
pcimhmmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikhwis hpa7tmwatli fyixre7t hjonli

drutta *Hosta ventricosa* is a PERENNIAL growing to 0.6 m (2ft) by 1 m (3ft 3in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from 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 Apomictic (reproduce by seeds formed without sexual fusion). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

kcaakta Edible Parts: Leaves StemEdible Uses: Young leaves and leaf stems - cooked. The white part of the stem is boiled[46, 61, 177].

tcanta A good ground cover plant, succeeding in dense shade but rather slow to spread[197]. Plants should be spaced about 60cm apart each way[208].

dwatta OdontalgicOdontalgic[74]. The root is used.

nrakta E. Asia - China. ksacta Rocky or stony river banks near ponds and lakes[74]. Forests, grassy slopes and hillsides at elevations of 500 - 2400 metres[266].

propta Seed - sow spring in a lightly shaded position in a greenhouse and only just cover the seed. Germination usually takes place within 1 - 3 months at 10°C. Make sure you keep the compost moist. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Division is possible at almost any time of the year so long as there is sufficient moisture[233]. It is best carried out in March as growth commences or in early autumn if the soil is not too dry[200]. Hostas can be left undivided for many years and should not be divided any more frequently than once every 3 - 5 years to allow the leaves to reach maturity[200].

nwatta Landscape Uses:Border, Container, Foundation, Ground cover, Seashore, Specimen. Thrives in most fertile soils if they are rich in humus[200]. Grows well in heavy clay soils and in sandy ones[208]. Very limy soils inhibit growth, but plants can thrive in such a situation if plenty of humus is added[208]. Prefers a pH between 6 and 7[200]. Requires a rich soil that does not dry out readily[1]. Succeeds in full sun as well as in deep shade, growing well in the semi-shade of a woodland[200, 233]. In general, the sunnier the position the moister the soil should be[233]. Plants are best not grown under trees in town gardens since the soot washed from the leaves of the trees in wet weather will tend to remain on the hosta[208]. Plants flower better when grown in a sunny position but the foliage is better when the plant is in a shady position[200]. Plants are in general fully hardy in Britain, but young leaves in spring can be destroyed by frost. New leaves are only produced in the spring and very early summer, so any damage at this time has a deep effect on the plant[233]. A vigorous plant, forming medium to large clumps[200]. Hybridizes freely with other members of this genus[200]. Since this species produces its seed apomictically, it should breed true[200] (unless there is also cross pollination of course). Cultivated for its root (used medicinally) in China[74]. Members of this genus are rarely if ever troubled by browsing deer or rabbits[233]. Plants are very attractive to slugs and snails, the young shoots in spring are especially at risk[111, K]. A number of named forms have been selected for their ornamental value[187]. Special Features:Attractive foliage, Naturalizing, Suitable for cut flowers.

4.2.238 Calochortus venustus

Butterfly Mariposa Lily

3 tlin 7 cyuc 2 kcaok 0 tcan 0 dwat 0.6 m hkuc
htut cyutli kyuctcup hwicli hrasjlut hpa7tli flatprikliwis
hpa7tmwattli xre7t hjonli

dwatta Calochortus venustus is a BULB growing to 0.6 m (2ft) by 0.1 m (0ft 4in). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

kcakta Edible Parts: RootEdible Uses: Bulb - cooked[94, 105, 257]. A sweet flavour[161].

nrakta South-western N. America - California. ksacta Light sandy soil, often decomposed granite, below 2400 metres[71, 90]. In grassland and in mixed evergreen forests[90, 200].

propta Seed - sow as soon as ripe or early spring in a cold frame in a very sharply draining medium. Stratification may be helpful for spring-sown seed, though this species usually germinates within two months without any treatment[120]. Germination usually takes place within 1 - 6 months at 15°C[138]. Leave the seedlings undisturbed for their first two years growth[138], but give them an occasional liquid feed to ensure they do not become nutrient deficient. It is quite difficult to get the seedlings through their first period of dormancy since it is all too easy either to dry

them out completely or keep them too moist when they will rot[214]. After their second year of growth, pot up the dormant bulbs in late summer and grow them on for at least another 2 years in the greenhouse before trying them outside. Seedlings take about 5 - 7 years to come into flower[214]. Division of the bulbs as soon as the foliage dies down. One report says that the bulbs must be planted into their permanent positions immediately[1], whilst another says that they can be stored overwinter and replanted in the spring[138]. Stem bulbils, harvested from the stems after flowering. Can be stored cool and dry then planted in pots in the cold frame in the spring.

nwatta Requires a deep very well-drained fertile sandy soil in a sunny position and must be kept rather dry from when the bulb flowers until late winter[1, 90, 200]. This is a rather difficult plant to cultivate in Britain, it is very cold hardy but is intolerant of wetness especially in the winter[1, 90]. It is easiest to grow in a bulb frame but is worth trying outdoors at the base of a south-facing wall, especially with shrubs that like these conditions[120]. It should not be crowded by other plants[214]. Bulbs can be lifted as soon as the foliage dies down in the summer and stored overwinter in a cool dry place, replanting in spring[138]. Another report says that they should be replanted immediately[1]. Bulbs frequently divide after flowering, the bulblets taking 2 years to reach flowering size[200]. Hand pollination is necessary if seed is required[1].

4.2.239 Lamium galeobdolon

Yellow Archangel

3 tlin 9 cyuc 2 kcaok 3 tcan 1 dwat 0.3 m hkuc
pcimhmimhtut cyutli hqattcup hwicli hrasjlutnyikfrilp hpa7tli
flatprikliwis hpa7tmwattli xre7t hjonli

drutta Lamium galeobdolon 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 6 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought.

kcakta Edible Parts: Flowers LeavesEdible Uses: Young leaves and shoots - cooked[183]. Young flowering tips - cooked.

tcanta A good ground cover plant, spreading rapidly by means of its rooting stems and succeeding even in dense shade. It is very vigorous, however, and can smother small plants[31, 197, 200]. It does very well in woodlands[K].

dwatta Antispasmodic Astringent Diuretic Expectorant Styptic VasoconstrictorThe herb is antispasmodic, astringent, diuretic, expectorant, styptic and vasoconstrictor[4].

nrakta Europe, including Britain, from Sweden south and east to Spain and Iran. ksacta Woods and shady hedgerows[5, 31], usually on heavier soils. Sometimes becoming locally dominant, especially after coppicing[17].

propta Seed - usually self sows freely and should not require human intervention. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in the summer. The seed can also be sown in situ as soon as it is ripe. Division in spring. Succeeds at almost any time in the growing season. Very easy, larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Landscape Uses:Ground cover, Massing, Woodland garden. A very easily grown plant, it tolerates most soils and conditions[200]. It grows well in heavy clay soils[17], though it prefers a light calcareous soil[1]. Dislikes dry soils[31]. This species succeeds even in dense shade, growing well under trees[31, 200]. Once established, it can also succeed in drought conditions under the shade of trees, providing there is plenty of humus in the soil[190]. There are at least four sub-species, *L. galeobdolon montanum* is the form generally found wild in Britain and it is a triploid. *L. galeobdolon luteum* and *L. galeobdolon flavidum* are both

lpidoids[187]. *L. galeobdolon argenteum* is the more rampant form, its clone 'Variegatum' is a commonly used ground cover plant for shady places[187]. Plants seem to be immune to the predations of rabbits[233]. A very invasive plant, sending out long prostrate shoots that root at intervals along the stems[31, 200]. Special Features: Attractive foliage, Naturalizing. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [2-1].

4.2.240 *Osmunda claytoniana*

Interrupted Fern

3 tlin 7 cyuc 2 kcak 0 tcan 1 dwat 0.5 m hkuc
hmmimhtut cyutli tcuphja7n hwicli hrasljutnyik hpa7tli frusflatprikliwis hpa7tmwatli hjonli

drutta *Osmunda claytoniana* is a FERN growing to 0.5 m (1ft 8in) by 0.3 m (1ft). See above for USDA hardiness. It is hardy to UK zone 3. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil.

pcista Although we have found no reports of toxicity for this species, a number of ferns contain carcinogens so some caution is advisable[200]. Many ferns also contain thiaminase, an enzyme that robs the body of its vitamin B complex. In small quantities this enzyme will do no harm to people eating an adequate diet that is rich in vitamin B, though large quantities can cause severe health problems. The enzyme is destroyed by heat or thorough drying, so cooking the plant will remove the thiaminase[172].

kcakta Edible Parts: Leaves Stem Edible Uses: The young fronds are eaten[183]. Cooked as a vegetable[177, 272]. The centre of the clump, below ground level, is the source of a small edible pith called 'fern butter'[183].

dwatta Vermifuge The roots are used as an adulterant for *Dryopteris felix-mas* in the treatment of internal worms[240].

nrakta E. Asia - China, Japan, Himalayas. Eastern N. America. ksacta Wet places in C. Japan[58]. Open slopes, rarely in forests, 2800 - 3300 metres in Kashmir[145].

propta Spores - they very quickly lose their viability (within 3 days) and are best sown as soon as they are ripe on the surface of a humus-rich sterilized soil in a lightly shaded place in a greenhouse. Keep the compost moist, preferably by putting a plastic bag over the pot. Plants develop very rapidly, pot on small clumps of plantlets as soon as they are large enough to handle and keep humid until they are well established. Do not plant outside until the ferns are at least 2 years old. Cultivars usually come true to type[200]. Divi-

tion of the rootstock in the dormant season. This is a very strenuous exercise due to the mass of wiry roots[200].

nwatta Likes a soil of swamp mud and loamy or fibrous peat, sand and loam[1]. Succeeds in most moist soils, preferring acid conditions[200]. Requires a constant supply of water, doing well by ponds, streams etc[1]. Plants thrive in full sun so long as there is no shortage of moisture in the soil and also in shady situations beneath shrubs etc[200]. Requires a shady position[188]. Plants are hardy to at least -20°C, they are evergreen in warm winter areas but deciduous elsewhere[200]. Members of this genus are rarely if ever troubled by browsing deer[233]. A very ornamental plant[1].

4.2.241 *Adenophora liliifolia*

Ladybells, Lilyleaf

3 tlin 8 cyuc 2 kcak 0 tcan 0 dwat 0.5 m hkuc
htut cyutli tcup hwicli hrasljut hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

drutta *Adenophora liliifolia* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.5 m (1ft 8in) at a medium rate. It is in flower in August, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy) and medium (loamy) soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

kcakta Edible Parts: Root Edible Uses: Root - cooked. Thick and esculent[2, 61, 105], it has a sweet flavour[74]. Eaten boiled and in soups etc[46, 177].

nrakta C. Europe to Siberia ksacta Woods and damp fields[45].

propta Seed - best sown in a cold frame as soon as it is ripe[200]. The seed can also be sown in spring. Surface sow 2 - 3 seeds per pot in the spring in order to avoid transplanting[133]. We have found that if transplanted when very small seedlings grow away without difficulty[K]. Germinates in 1 - 3 months at 10°C[133]. Plant out into their permanent positions whilst young. Basal cuttings in spring[K]. Division in spring - very difficult because the plant dislikes root disturbance[1].

nwatta Landscape Uses: Border, Container, Woodland garden. Prefers a light rich slightly alkaline soil that is not too dry, and a warm sunny position[1, 200]. Plants are intolerant of root disturbance and should be planted out into their permanent positions when young[1]. This species has been cultivated for its edible root in Japan[46, 238]. The flowers have a sweet but refreshing perfume[245]. This is the only member of the genus with scented flowers[245]. The young growth is extremely attractive to slugs, they have been known to destroy even mature plants[K]. Special Features: Not North American native, Naturalizing, Suitable for cut flowers, Fragrant flowers.

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