

Plants For a Future 2021CE

Hardiness Zone 3, Acidic, Poor Soil

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1 Introduction

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

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

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

You need about a hectare of land (2.5 acres) per person if you have 6 months growing season (where average temperature is above 10C), at least half of 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 you dry season digging swales and vernal pools, that will collect the rain water during the flash floods and keep it in place so that it enters the ground, then you can grow things downhill of your vernal pools and swales. It is generally more important that they be

extensive than deep. You want to ideally catch every drop, so that none of it leaves your property.

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

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

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

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

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

1.1 Pronunciation guide

a /a/, b /b/, c /j/ "sh", d /d/, e /e/, f /f/, g /g/, h /h/, i /i/, j /j/ "zh", k /k/, l /l/, m /m/, n /n/, o /o/, p /p/, q /ŋ/ "ng", r /r/, s /s/, t /t/, u /u/, v /v/, w /w/, x /x/ /ʒ/ "gh", y /j/, z /z/, 2 /1/ (low tone), 6 /ə/ "uh", 7 /1/ (high tone).

1.2 vocabulary

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

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

hgat /hgat/ drought (tolerant), kyuc /kju/ dry, tcup /tʃup/ damp, hja7n /hʒa7n/ wet, hs6s /hsəs/ puddle, hwic /hwɪ/ water (requirement).

hjis /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.

fjif /fjif/ self (fertile), xre7t /xre7t/, nyanhjen /njanhʒen/ male-female (dioecious, distinct male and female plants), hjon /hʒon/ sex.

hmcu /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 /tfo2n/ nitrogen-fixing, xlutkfam /ʒlut,kfam/ plant quantity, bwon /bwon/ bean, mran /mran/ corn/grain non-nitrogen-fixing plant, nrak /nrak/ continent (of origin), ksac /ksa/ circumstances/habitat.

3 hmuctrotkcac, tcup hmuchwic, 0 ksanckak, hjis hmuchpa7t, flat hmuchpa7tmwat, 109 xlutkfam.

2 1 lin

2.0.1 *Pinus cembra sibirica*

Siberian Pine

1 tin 6 cyuc 4 kcaak 3 tcan 2 dwat 30 m hkcuc
htut cyutli hgatykyuctup hwicli hyishrasjlut hpa7tli flatprik
hpa7tmwatli dyat hjonli

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

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

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

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

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

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

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

method only works when taken from very young trees less than 10 years old. Use single leaf fascicles with the base of the short shoot. Disbudding the shoots some weeks before taking the cuttings can help. Cuttings are normally slow to grow away[81].

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

2.0.2 *Pinus contorta*

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

drutta *Pinus contorta* is an evergreen Tree growing to 15 m (49ft) by 8 m (26ft) at a fast rate. See above for USDA hardness. It is hardy to UK zone 7. It is in leaf all year, in flower in May, and the seeds ripen from January to February. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry moist or wet soil and can tolerate drought. The plant can tolerate maritime exposure.

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

kcakta Edible Parts: Inner bark Sap Seed Edible Uses: Condiment Gum Inner bark - raw or cooked[2, 94, 105, 161, 257]. It can be used fresh or dried. It is mashed into a pulp and made into cakes then baked[94]. Harvested in early spring, the taste is not unpleasant, but it develops a strong taste of turpentine as the season advances[2]. The inner bark is ready to harvest when the male cones are producing pollen[257]. A famine food, it is only used when all else fails. Sap - collected in spring and used as a drink[161, 177]. Seed - raw or cooked[257]. A gum is made from the pitch obtained from the trunk. It is allowed to harden and used for chewing[257]. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Adhesive Dye Fuel Gum Herbicide Pitch String Waterproofing Wood A tan or green dye is obtained from the needles[168]. The roots have been braided by the N. American Indians to make a rope[226]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. A pitch obtained from this tree is used for waterproofing canoes, baskets, shoes etc and as a glue[64, 99, 226, 257]. It has also been used to preserve wood, baskets etc[257]. The pitch is not a commercially important crop[64]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tap-

ping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. Wood - straight but coarse-grained, light, hard, strong, brittle[60, 82]. It varies from light and soft to hard and heavy[229]. Easily worked, it is used for general construction, posts, poles, pulp etc[60, 82, 99, 171, 226, 229]. It makes a good fuel, burning well even when green because it is rich in pitch[99, 226].

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

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

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

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

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

3 2 tlin

3.1 bwon

3.1.1 Caragana arborescens

Siberian Tea Tree, Siberian peashrub
tfo2n 2 tlin 7 cyuc 5 ckak 4 tcan 1 dwat 6 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

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

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

kcakta Edible Parts: Oil Seed SeedpodEdible Uses: OilSeed - cooked[2, 105]. Small but produced in abundance[11], there are 4 - 6 seeds per pod[202]. A bland flavour, it is best used in spicy dishes[183]. The raw seed has a mild pea-like flavour, though we are not sure if it should be eaten in quantity when raw[K]. The seed contains 12.4% of a fatty oil and up to 36% protein[183, 269], it has been recommended as an emergency food for humans[65]. More than just an emergency food, this species has the potential to become a staple crop in areas with continental climates[K]. Young pods - cooked and used as a vegetable[46, 61, 105, 177, 183, 269].

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

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

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

propta Seed - best sown as soon as it is ripe in a cold frame[200]. It usually germinates in 2 weeks[K]. Stored seed should be pre-soaked for 24 hours in warm water then sown in a cold frame[78, 113, 200]. If the seed has not swollen then scarify it and re-soak for another 12 hours before sowing[138]. Germination usually takes place within 2 - 3 weeks at 20°C[138]. Good percentage[11]. As soon as they are

ough enough to handle, prick the seedlings out into individual pots and grow them on in a greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. There are approximately 40,000 seeds per kilo[269]. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame[113]. Layering in spring.

nwatta Agroforestry Services: Living fence Agroforestry Services: Nitrogen Agroforestry Services: Windbreak Industrial Crop: Biomass Management: Coppice Management: Standard Minor Global Crop Staple Crop: ProteinSucceeds in most well-drained soils, preferring full sun and a light sandy or well-drained soil[1, 11, 200]. Tolerates very alkaline soils[202]. Plants do not require a rich soil[1, 11, 108], succeeding on marginal land[160]. Established plants are drought resistant[160]. Fast growing[188]. Dormant plants are hardy to about -30°C[184], they prefer a continental climate and do not grow so well in areas that do not have very cold winters[200]. They grow and fruit very well in the eastern half of the country, even in northern areas, though they do not do so well in the wetter west[K]. The young growth in spring, even on mature plants, is frost-tender and so it is best to grow the plants in a position sheltered from the early morning sun[K]. The Siberian pea shrub has an excellent potential to become a staple food crop. The seed is nutritious and wholesome, although rather small it is often very freely borne and is easily harvested[K]. This species has also been recommended as a nitrogen-fixing windbreak and ground cover plant that binds the soil and produces fibre and dye stuffs[218]. *C. boissii* and *C. fruticosa* are closely related to this species[182] and can probably be used similarly[K]. A very ornamental plant, some named forms have been developed for their ornamental value[182]. 'Nana' is a very compact dwarf form[183] that grows slowly[11]. 'Pendula' has stiffly pendent branches but is otherwise the same as the type species[11]. A good bee plant[74]. Plants in this genus are notably resistant to honey fungus[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2].

3.1.2 *Elaeagnus angustifolia*

Oleaster, Russian olive

tfo2n 2 tlin 7 cyuc 4 kcaak 4 tcan 2 dwat 7 m hkuc
thtut cywlll hgatkuyctucp hwclli hyshtsrsljtnyik hpa7tli flat-
prklkwsliphsom hpa7tmwatli xre7t hjonli

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

kcakta Edible Parts: Fruit SeedEdible Uses: GumFruit - raw or cooked as a seasoning in soups[1, 2, 3, 100, 146, 74]. Dry, sweet and mealy[11, 145, 183]. The fruit can also be made into jellies or sherbets[183]. The fruit must be fully

ripe before it can be enjoyed raw, if even slightly under-ripe it will be quite astringent[K]. The oval fruit is about 10mm long[200] and contains a single large seed[K]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous[K].

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

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

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

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

nwatta Agroforestry Services: Nitrogen Agroforestry Services: Windbreak Fodder: Bank Industrial Crop: Biomass Management: Coppice Management: Coppice Management: Standard Minor Global CropLandscape Uses:Screen, Specimen. An easily grown plant, it succeeds in most soils that are well-drained[200], though it dislikes shallow chalk soils[98]. Prefers a light sandy soil that is only moderately fertile[11], succeeding in poor soils and dry soils[11, 200]. Requires a position in full sun, growing very well in hot dry positions[182]. Plants are very drought and wind resistant[1, 166, 200], they tolerate conditions of considerable salinity and alkalinity[227]. A very hardy plant, tolerating temperatures down to about -40°C[184]. However, plants prefer a continental climate[49] and are apt to be cut back in severe winters in Britain because the summer is often not warm enough to have fully ripened the wood[1]. A very variable species[214]. This species is often cultivated in N. Europe for its edible fruits, there are many named varieties and some of these are thornless[214]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[160, 200]. An excellent companion plant, when grown in orchards it can increase yields from the fruit trees by up to 10%. Plants are very tolerant of pruning, they usually resprout freely even when cut right back to the ground. This species is notably resistant to honey fungus[88, 200]. The flowers are sweetly and heavily scented[184]. Special Features: Attractive foliage, Not North American native, Invasive, Naturalizing, Fragrant flowers, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant

Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is fleshy. Thick or swollen - fibrous or tap root [2-1].

3.1.3 Caragana boissii

Siberian peatree

tfo2n 2 tlin 9 cyuc 4 kcaak 4 tcan 0 dwat 2 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

drutta *Caragana boissii* is a deciduous Shrub growing to 2 m (6ft) by 1.5 m (5ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower in May, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista The following report belongs to the closely related *C. arborescens*. Reports that this plant contains toxins have not been substantiated[65]. The occurrence of cystine in the seeds is doubtful[65].

kcakta Edible Parts: Oil Seed Seedpod Edible Uses: Oil The following uses are for the closely related *C. arborescens* and can probably also be applied to this species[K]. Seed - cooked[2, 105]. Small but produced in abundance[11], there are 4 - 6 seeds per pod[202]. A bland flavour, it is best used in spicy dishes[183]. The raw seed has a mild pea-like flavour, though we are not sure if it should be eaten in quantity when raw[K]. The seed contains 12.4% of a fatty oil and up to 36% protein[183], it has been recommended as an emergency food for humans[65]. Young pods-cooked and used as a vegetable[46, 61, 105, 177, 183].

tcanta Dye Fibre Hedge Oil Shelterbelt Soil stabilization The following uses are for the closely related *C. arborescens* and can probably also be applied to this species[K]. A fibre is obtained from the bark, used for cordage[46, 61, 74]. A blue dye is obtained from the leaves[74]. The seed contains 12.4% of a fatty oil[74]. The plant can be grown as a hedge[160]. It is quite wind-resistant and can also be planted in a shelterbelt[200]. The plant has an extensive root system and can be used for erosion control, especially on marginal land[160].

nrakta E. Asia - China. ksakta Not known

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

nwatta Succeeds in most well-drained soils, preferring full sun and a light sandy dry or well-drained soil[1, 11, 200]. Tolerates very alkaline soils[202]. Does not require a rich soil[1, 11, 108], succeeding on marginal land[160]. Established plants are drought resistant[160]. Fast growing[188]. This species is hardy to at least -30°C[184], it prefers a continental climate with hot summers and cold winters so it does not grow so well in the milder western half of Britain[200]. This species is closely related to *C. arborescens*, differing in the longer teeth of the calyx and in the downy ovary and young fruit[11]. It can probably be used in all the ways *C. arborescens* is used and therefore has an excellent potential for

human food.[K]. A good bee plant[74]. Plants in this genus are notably resistant to honey fungus[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200].

3.1.4 Elaeagnus commutata

Silverberry

tfo2n 2 tlin 6 cyuc 3 kcaak 4 tcan 2 dwat 3 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

drutta *Elaeagnus commutata* is a deciduous Shrub growing to 3 m (9ft) by 1.5 m (5ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower in May, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

kcakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw or cooked[1, 2, 3, 43, 106]. Dry and mealy[11, 95, 172, 183]. Good when added to soups they also make an excellent jelly[183]. The fruit must be fully ripe before it can be enjoyed raw, if even slightly under-ripe it will be quite astringent[K]. The fruit contains a single large seed[K]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous[K].

tcanta Beads Companion Fibre Hedge Hedge Soap-Plants can be grown as a hedge in exposed positions, tolerating maritime exposure. They have a rather open habit, however, and so do not afford a lot of wind protection. Because they fix atmospheric nitrogen, they enrich the soil and so make a very good companion hedge in orchards etc[K]. The fibrous bark is used in weaving, it has been twisted to make strong ropes and has also been used to make blankets and clothing[99, 257]. Dried fruits are used as beads[99, 257]. The berries have been used to make a soap[257].

dwatta Cancer Salve VDA strong decoction of the bark, mixed with oil, has been used as a salve for children with frostbite[257]. A decoction of the roots, combined with sumac roots (*Rhus* spp.), has been used in the treatment of syphilis[257]. This medicine was considered to be very poisonous and, if you survived it, you were likely to become sterile[257]. The fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214].

nrakta N. America - Quebec to Alaska and south to Utah, S. Dakota and Minnesota.. ksakta Dry calcareous slopes[43, 184].

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate in late winter or early spring, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Cuttings of mature wood of the current year's growth, 10 - 12cm with a heel, October/November in a frame[200]. The cuttings are rather slow and difficult to root, leave them for 12 months[113]. Layering in September/October. Takes 12 months[78]. Division of suckers during the dormant season[3, 11]. The larger suckers can be planted out direct into their permanent positions, but it is probably best to pot up smaller suckers and grow them on in a cold frame until they are established.

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

its natural habitat, it should grow well on chalk[K]. Prefers a light sandy soil that is only moderately fertile, succeeding in poor and dry soils[11, 200]. Requires a position in full sun[11, 200]. Plants are very drought and wind resistant[1, 11, 200]. A very hardy plant, tolerating temperatures down to about -40°C[184]. However, plants prefer a continental climate and are liable to be cut back in severe winters in Britain mainly because the wood is not fully ripened in our cooler summers. A moderately fast-growing plant[202]. The small flowers are deliciously scented[245]. This species does not normally require pruning but the plant can regenerate from very old wood and so can be cut back severely if required[202]. Plants resent root disturbance and should be placed in their permanent positions as soon as possible[202]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. An excellent companion plant, when grown in orchards it can increase yields from the fruit trees by up to 10%. Often confused with *E. angustifolia* even though it is very distinct[50]. Plants produce suckers quite freely, often sending them up at some distance from the plant[182, K]. This species is notably resistant to honey fungus[88, 200]. The plant is heat tolerant in zones 6 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone, 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multi-stemmed with multiple stems from the crown [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

3.1.5 *Shepherdia canadensis*

Buffalo Berry, Russet buffaloberry, Canada Buffaloberry
 2fto 2m 2 tin 6 cyuc 3 ckac 3 tcan 2 dwat 2.5 m kuc
 hmimhtut cyutli hgatkuyctucp hwicli hyishrasjlutnyik hpa7tli
 flatprkrlwis hpa7tmwatli nyanhjen hjonli

drutta *Shepherdia canadensis* is a deciduous Shrub growing to 2.5 m (8ft 2in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower in April, and the seeds ripen from July to September. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). The plant is not self-fertile. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate maritime exposure.

pcista The fruit contains low concentrations of saponins[101]. Although toxic, these substances are very poorly absorbed by the body and so tend to pass through without causing harm. They are also broken down by thorough cooking. Saponins are found in many plants, including several that are often used for food, such as certain beans. It is advisable not to eat large quantities of food that contain saponins. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K].

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[2, 3, 22, 46, 85, 101]. The fruit can also be dried and used like currants. A tart but pleasant flavour even before a frost, it becomes sweeter after frosts[62]. Another report says that the fruit is bitter and is dried, smoked or pressed into cakes[183]. The fruit was a favourite treat of the North American Indians, they would beat it in an equal quantity

of water until a foam with a consistency of beaten eggs was formed. It was important that the berries were not allowed to come into contact with anything greasy since this would prevent it becoming foamy[256]. The foam would then be flavoured with a sweet food such as cooked 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].

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

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

propta Seed - it must not be allowed to dry out[113]. It is best harvested in the autumn and sown immediately in a cold frame. Stored seed requires 2 - 3 months cold stratification[113]. Prick out the seedlings into individual pots once they are large enough to handle. If sufficient growth is made it will be possible to plant them out in the summer, otherwise grow them on in a cold frame for their first winter and plant them out in the following spring or early summer. Cuttings of half-ripe wood, July/August in a frame sometimes work[113].

nwatta Landscape Uses: Erosion control, Hedge, Massing, Superior hedge. Succeeds in an ordinary well-drained moisture retentive soil[1, 3, 11]. Tolerates poor dry soils[200] and maritime exposure[182]. Established plants are drought resistant[182]. Plants can accumulate mercury when they are grown in polluted soils[172]. Rarely produces fruits in Britain[182]. Some named varieties have been developed for their ornamental value[200]. 'Xanthocarpa' has yellow fruits, 'Rubra' has red fruits[200]. Plants in this genus are notably resistant to honey fungus[200]. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]. Dioecious. Male and female plants must be grown if fruit and seed is required. Special Features: North American native, Inconspicuous flowers or blooms. For polyculture de-

as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2].

3.1.6 *Amorpha canescens*

Lead Plant
tfo2n 2 tlin 9 cyuc 2 kcaak 3 tcan 2 dwat 1.2 m hkuc
hmimhtut cyutli hगतkyuctcup hwicli hyishrasjlut hpa7tli flat-
prikkwis 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].

dwatta 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 if it 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 -25°C[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].

3.1.7 *Alnus sinuata*

Sitka Alder
tfo2n 2 tlin 9 cyuc 1 kcaak 3 tcan 1 dwat 4 m hkuc
hmimhtut cyutli tcuphja7n hwicli hysjlutnyikfrp hpa7tli flat-
prikkwis hpa7tmwatli hjonli

drutta *Alnus sinuata* is a deciduous Shrub growing to 4 m (13ft 1in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from April to June, 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 can fix Nitrogen. Suitable for: 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 moist or wet soil.

pcista The freshly harvested inner bark is emetic but is alright once it has been dried[172].

kcakta Edible Parts: FlowersEdible Uses: Catkins - raw or cooked. A bitter flavour[172].

tcanta Fuel Pioneer Soil stabilization Tannin WoodThis is an excellent pioneer species for re-establishing woodlands on disused farmland, difficult sites etc[226]. Its fast rate of growth means that it quickly provides sheltered conditions to allow more permanent woodland trees to become established. In addition, bacteria on the roots fix atmospheric nitrogen - whilst this enables the tree to grow well in quite poor soils it also makes some of this nitrogen available to other plants growing nearby. Alder trees also have a heavy leaf canopy and when the leaves fall in the autumn they help to build up the humus content of the soil. Alder seedlings do not compete well in shady woodland conditions and so this species gradually dies out as the other trees become established[K]. The bark and the strobils are a source of tannin[82]. The tree has an extensive root system and can be planted to control banks from erosion[226, 229]. Wood - soft, straight-grained, very durable in water[82]. The tree is too small to be of use as a source of lumber, but the wood is used locally for fuel[226, 229].

dwatta Astringent Emetic Haemostatic Stomachic TonicThe bark is astringent, emetic, haemostatic, stomachic and tonic[172].

nrakta Western N. America - Alaska to California - east to Idaho and Montana. ksacta Moist woods, stream banks, margins of ponds, to open but moist montane slopes at or near the timber line[60].

propta Seed - best sown in a cold frame as soon as it is ripe and only just covered[200]. Spring sown seed should also germinate successfully so long as it is not covered[200, K]. The seed should germinate in the spring as the weather warms up. When large enough to handle, prick the seedlings out into individual pots. If growth is sufficient, it is possible to plant them out into their permanent positions in the summer, otherwise keep them in pots outdoors and plant them out in the spring. If you have sufficient quantity of seed, it can be sown thinly in an outdoor seed bed in the spring[78]. The seedlings can either be planted out into their permanent positions in the autumn/winter, or they can be allowed to grow on in the seed bed for a further season before planting them. Cuttings of mature wood, taken as soon as the leaves fall in autumn, outdoors in sandy soil.

nwatta Prefers a heavy soil and a damp situation[1, 11]. Grows well in heavy clay soils[11]. Tolerates very infertile sites[200]. This species is closely related to *A. viridis* and is included as a sub-species of *A. viridis* by many botanists[11].

A fast-growing but short-lived species, rarely living longer than 50 years[229]. It is a pioneer species of logged or burnt land, often forming dense thickets in low wet areas[229]. 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]. 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].

3.1.8 *Alnus rugosa*

Speckled Alder

tfo2n 2 tlin 6 cyuc 0 kcak 3 tcan 2 dwat 22 m hkuc
hmmihtut cyutli tcuphja7n hwicli hyisjlutnyikfrip hpa7tli flat-
prlikwis hpa7tmwatli hjonli

drutta *Alnus rugosa* is a deciduous Tree growing to 22 m (72ft 2in) 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 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: 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 moist or wet soil.

tcanta Dye Pioneer Soil stabilization WoodThis is an excellent pioneer species for re-establishing woodlands on disused farmland, difficult sites etc[226]. Its fast rate of growth means that it quickly provides sheltered conditions to allow more permanent woodland trees to become established. In addition, bacteria on the roots fix atmospheric nitrogen - whilst this enables the tree to grow well in quite poor soils it also makes some of this nitrogen available to other plants growing nearby. Alder trees also have a heavy leaf canopy and when the leaves fall in the autumn they help to build up the humus content of the soil. Alder seedlings do not compete well in shady woodland conditions and so this species gradually dies out as the other trees become established[K]. The tree has an extensive root system and can be planted to control banks from erosion[226]. A dark dye is obtained from the bark[226]. Browns, through red to orange colours can be obtained from the bark[257]. The wood is soft, weighing 29lb per cubic foot[235]. The tree is too small to be of importance for lumber or fuel[229].

dwatta Alternative Anodyne Astringent Cathartic Emetic Febrifuge Odontalgic Ophthalmic Stomachic TonicThe speckled alder was quite widely used medicinally by the native North American Indians who used it to treat a variety of complaints[257]. It is little used in modern herbalism. The bark is alterative, astringent, emetic, laxative, ophthalmic, stomachic and tonic[46, 61, 257]. The bark contains salicin[226], which probably decomposes into salicylic acid (closely related to aspirin) in the human body[213]. This is used as an anodyne and febrifuge[226]. The root bark was mixed with molasses and used in the treatment of toothache[257]. A decoction of the inner bark was used as a wash for sore eyes[257]. The outer bark is astringent and is applied as a poultice to bleeding wounds, it also reduces swellings[226].

nrakta Northern and Eastern N. America - Hudson's Bay to Virginia. Naturalized in C. Europe[50]. ksacta Wet sandy or gravelly soils, usually along streams and rivers, but also in ponds and swamps[229]. It is only found in open sunny areas, being unable to compete in dense shade[229].

propta Seed - best sown in a cold frame as soon as it is ripe and only just covered[200]. Spring sown seed should also germinate successfully so long as it is not covered[200, K]. The seed should germinate in the spring as the weather warms up. When large enough to handle, prick the seedlings out into individual pots. If growth is sufficient, it is possible to plant them out into their permanent positions in the summer, otherwise keep them in pots outdoors and plant them out in the spring. If you have sufficient quantity of seed, it can be sown thinly in an outdoor seed bed in the spring[78]. The

seedlings can either be planted out into their permanent positions in the autumn/winter, or they can be allowed to grow on in the seed bed for a further season before planting them. Cuttings of mature wood, taken as soon as the leaves fall in autumn, outdoors in sandy soil.

nwatta Prefers a heavy soil and a damp situation[1, 11]. Grows well in heavy clay soils[11]. Tolerates very infertile sites[200]. A fast-growing but short-lived tree[229]. Closely related to *A. incana*[11] and considered to be no more than a sub-species (*A. incana rugosa*) by some botanists[226]. 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]. For polyculture design as well as the above-ground 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].

3.1.9 *Alnus incana*

Grey Alder, Speckled alder, Thinleaf alder, White Alder
tfo2n 2 tlin 6 cyuc 0 kcak 3 tcan 0 dwat 18 m hkuc
hmmihtut cyutli kyuctcuphja7n hwicli hyisjlutnyikfrip hpa7tli
flatprlikwis hpa7tmwatli hjonli

drutta *Alnus incana* is a deciduous Tree growing to 18 m (59ft) by 5 m (16ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from February to March. 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: 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 moist or wet soil. The plant can tolerate maritime exposure.

tcanta Pioneer Soil reclamation Tannin WoodThis species fixes atmospheric nitrogen and is also tolerant of polluted soils, it can be used for land reclamation, especially on coal tips[200]. This is an excellent pioneer species for re-establishing woodlands on disused farmland, difficult sites etc. Its fast rate of growth means that it quickly provides sheltered conditions to allow more permanent woodland trees to become established. In addition, bacteria on the roots fix atmospheric nitrogen - whilst this enables the tree to grow well in quite poor soils it also makes some of this nitrogen available to other plants growing nearby. Alder trees also have a heavy leaf canopy and when the leaves fall in the autumn they help to build up the humus content of the soil. Alder seedlings do not compete well in shady woodland conditions and so this species gradually dies out as the other trees become established[K]. The bark and the fruits contain up to 20% tannin[46, 61, 223]. Wood - light, soft, fairly elastic, easy to split. Used for clogs, bowls, woodcuts etc. Much valued by cabinet makers[46, 61].

nrakta Europe. Introduced in Britain[17]. ksacta Mountains, especially on poor soil[17, 50].

propta Seed - best sown in a cold frame as soon as it is ripe and only just covered[200]. Spring sown seed should also germinate successfully so long as it is not covered[200, K]. The seed should germinate in the spring as the weather warms up. When large enough to handle, prick the seedlings out into individual pots. If growth is sufficient, it is possible to plant them out into their permanent positions in the summer, otherwise keep them in pots outdoors and plant them out in the spring. If you have sufficient quantity of seed, it can be sown thinly in an outdoor seed bed in the spring[78]. The seedlings can either be planted out into their permanent positions in the autumn/winter, or they can be allowed to grow on in the seed bed for a further season before planting them. Cuttings of mature wood, taken as soon as the leaves fall in autumn, outdoors in sandy soil.

nwatta Landscape Uses:Pollard, Specimen. Prefers a heavy soil and a damp situation[1, 11]. Grows well in heavy clay soils[11]. Thrives in drier soils than many other members of this genus[200]. Tolerates very infertile sites[200]. 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]. Special Features: Attractive foliage, Not North American native, Wetlands plant, 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.) For polyculture design as well as the above-ground 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].

3.2 mran

3.2.1 *Betula pendula*

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

2 tlin 6 cyuc 3 kcaak 5 tcan 3 dwat 20 m hukc
htut cyutli kyuctcup hwicli hyishrasj|lutnyikfrip hpa7tli frus-
flatprikhwis hpa7tmwatli hjonli

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.

Betula pendula has 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]

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 scum'd '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].

Medicinal Uses: *Betula pendula* is used in traditional medicine for a variety of ailments. The bark is used as a diuretic and laxative. The leaves are used as a diuretic and laxative. The inner bark is used as a diuretic and laxative. The buds are used as a diuretic and laxative. The wood is used as a diuretic and laxative. The bark is used as a diuretic and laxative. The leaves are used as a diuretic and laxative. The inner bark is used as a diuretic and laxative. The buds are used as a diuretic and laxative. The wood is used as a diuretic and laxative.

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

Medicinal Uses: *Betula pendula* is used in traditional medicine for a variety of ailments. The bark is used as a diuretic and laxative. The leaves are used as a diuretic and laxative. The inner bark is used as a diuretic and laxative. The buds are used as a diuretic and laxative. The wood is used as a diuretic and laxative. The bark is used as a diuretic and laxative. The leaves are used as a diuretic and laxative. The inner bark is used as a diuretic and laxative. The buds are used as a diuretic and laxative. The wood is used as a diuretic and laxative.

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Medicinal Uses: *Betula pendula* is used in traditional medicine for a variety of ailments. The bark is used as a diuretic and laxative. The leaves are used as a diuretic and laxative. The inner bark is used as a diuretic and laxative. The buds are used as a diuretic and laxative. The wood is used as a diuretic and laxative.

Medicinal Uses: *Betula pendula* is used in traditional medicine for a variety of ailments. The bark is used as a diuretic and laxative. The leaves are used as a diuretic and laxative. The inner bark is used as a diuretic and laxative. The buds are used as a diuretic and laxative. The wood is used as a diuretic and laxative.

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.

3.2.2 *Betula pubescens*

White Birch, Downy birch

2 tlin 9 cyuc 3 kcak 5 tcan 3 dwat 20 m hkc
htut cyutli kyuctcuphja7n hwicli hyhshrasjlutnyikfrip hpa7tli frusflatprikliw hpa7tmwatli hjonli

drutta *Betula pubescens* is a deciduous Tree growing to 20 m (65ft) by 10 m (32ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 1. It is in flower in April, and the seeds ripen from August to September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acid soils. It cannot grow in the shade. It prefers dry moist or wet soil. The plant can tolerate strong winds but not maritime exposure.

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

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

tcanta Adhesive Besom Charcoal Compost Dye Essential Fibre Fungicide Miscellany Paper Pioneer Polish Repellent Tannin Thatching Waterproofing WoodThe bark is used to make drinking vessels, canoe skins, roofing tiles etc. It is waterproof, durable, tough and resinous[11, 61]. Only the outer bark is removed, this does not kill the tree. It is most easily removed in late spring to early summer. The bark was pressed flat and stored until the following spring. When re-

quired 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 UrinaryAnti-inflammatory, cholagogue, diaphoretic[21, 165, 201]. The bark is diuretic and laxative[7]. The inner bark is bitter and astringent, it is used in treating intermittent fevers[4]. An oil obtained from the inner bark is astringent and is used in the treatment of various skin afflictions, especially eczema and psoriasis[4, 238]. The bark is usually obtained from trees that have been felled for timber and can be distilled at any time of the year[238]. The buds are balsamic[7]. The young shoots and leaves secrete a resinous substance which has acid properties, when combined with alkalis it is a tonic laxative[4]. The leaves are anticholenterolemic and diuretic[7]. They also contain phytosides, which are effective germicides[7]. An infusion of the leaves is used in the treatment of gout, dropsy and rheumatism, and is recommended as a reliable solvent of kidney stones[4]. The young leaves and leaf buds are harvested in the spring and dried for later use[238]. A decoction of the leaves and bark is used for bathing skin eruptions[4]. The vernal sap is diuretic[4]. The boiled and powdered wood has been applied to chafed skin[257]. Moxa is made from the yellow 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, 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 grow-

fring 1 metre a year but it is short-lived[186]. It is one of the first trees to colonize open land and it creates a suitable environment for other woodland trees to follow[11]. These trees eventually shade out the birch trees[186]. Trees take about 15 years from seed to produce their own seed[98]. Although closely related, it does not usually hybridize with *B. pendula*[11]. It hybridizes freely with *B. pendula* according to another report[186]. A superb tree for encouraging wildlife, it has over 200 associated insect species[24, 30]. A good plant to grow near the compost heap, aiding the fermentation process[14, 20]. It is also a good companion plant, its root activity working to improve the soil[14]. Trees are notably susceptible to honey fungus[200].

3.2.3 *Ribes alpinum*

Alpine Currant

2 tlin 7 cyuc 3 kcaak 4 tcan 0 dwat 1.2 m hkuc
hmmhtut 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.

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

nrakta Europe, including Britain, from Scandinavia south and east to N. Africa, Italy, Montenegro, Bulgaria ksacta Cliffs and rocky woods on limestone[17].

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame. Stored seed requires 3 months cold stratification at 0 - 9°C and should be sown as early in the year as possible[113, 164]. Under normal storage conditions the seed can remain viable for 17 years or more. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in a cold frame for their first winter, planting them out in late spring of the following year. Cuttings of half-ripe wood, July/August in a frame[113]. Cuttings of mature wood of the current year's growth, preferably with a heel of the previous year's growth, November to February in a cold frame or sheltered bed outdoors[78, 200].

nwtata 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.

3.2.4 *Calendula officinalis*

calendula, Pot Marigold

2 tlin 11 cyuc 3 kcaak 4 tcan 5 dwat 0.6 m hkuc

hmmhtut cyutli tcup hwicli hyishrasjlutnyik hpa7tli frust-
prikwissiip 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

sidesides[200].

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

nwatta Landscape Uses: Border, Container, Massing, Rock garden. An easily grown plant, it succeeds in any well-drained soil[200, 268], though it prefers a good loam and requires a sunny or at least partially sunny position[4, 15, 200, 268]. Plants flower best when they are grown in a poor soil[108]. Tolerates a pH in the range 4.5 to 8.3. The pot marigold is a very ornamental plant that is commonly grown in the flower garden, and occasionally as a culinary herb, there are some named varieties[183]. When well-sited it usually self-sows freely and will maintain itself if allowed[1, 4]. The flowers are sensitive to variations in temperature and dampness, closing when it is dark and when rain is expected[7, 244]. All parts of the plant are pungently scented[245]. The growing plant attracts hoverflies to the garden, the young of which are fairly efficient eaters of aphids[24, 201]. The flowers are attractive to bees[108]. Marigolds are good companion plants, they grow well with tomatoes[14]. Cucumber mosaic disease and powdery mildew can cause problems with this plant[188]. Special Features: Edible, Not North American native, Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers, Extended bloom season in Zones 9A and above. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

3.2.5 *Larix occidentalis*

Western Larch

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

drutta *Larix occidentalis* is a deciduous Tree growing to 45 m (147ft 8in) at a fast rate. See above for USDA hardness. 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 SapEdible Uses: Gum SweetenerA 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 WoodA red powder can be made by heating the resin and then grinding it. 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 Poullice SalveThe 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 TimberLandscape 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.

3.2.6 *Picea abies*

Norway Spruce

2 tlin 7 cyuc 2 kcaak 4 tcan 1 dwat 30 m hkuc
htut cyutli tcuphja7n hwicli hyhshrasjlutnyik 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 hardness. 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 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]. 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].

caanta Adhesive Essential Pitch Shelterbelt Tannin Varnish WoodThe 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 Poulitice Sedative Vitamin CThe buds, leaves and resin are antibiotic, antiseptic, balsamic, expectorant, sedative[7]. A pitch, or resin, obtained from the trunk is rubefacient and stimulant[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 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:Firewood, Screen, Specimen. Likes abundant moisture at the roots, if grown in drier areas 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] according to one report whilst another says that it is moderately shade tolerant[125]. Intolerant of atmospheric pollution[11]. Resists wind exposure to some degree and is tolerant 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]. Probably not that long-lived in Britain, about 200 years seems the absolute maximum[185]. 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' 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 biological 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 flowers or blooms.

3.2.7 *Larix laricina*

Tamarack, Hackmatack, American Larch
2 tlin 5cyc 2 kcaok 0 tcan 2 dwat 18 m hkuc
htut cyutili tcuphja7n hwicli hyishrasjlut hpa7tli flatpriklwis 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 nutritionally 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: LeavesEdible Uses: TeaThe 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].

caanta Disinfectant Fibre Resin Tannin WoodResin is extracted 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 Alterative Astringent Disinfectant Diuretic Expectorant Laxative Poulitice Salve TonicTamarack was employed medicinally 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. A tea made from the bark is alterative, diuretic, laxative and tonic[4, 222]. It is used 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. ksacta 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 months 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.

3.2.8 Picea glauca

White Spruce, Black Hills Spruce, Canadian Spruce

2 tlin 6 cyuc 2 kcaac 3 tcan 2 dwat 15 m hkuc
htut cyutiit tucpha'ja'n hwicli hyihshrasjlutnyikfrip hpa7tli frus-
flatprik hpa7tmwatli hñoni

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-podEdible Uses: Condiment 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 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. ksacta 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 to some degree[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.

3.2.9 Pinus banksiana

Jack Pine

2 tlin 7 cyuc 2 kcaak 0 tcan 2 dwat 12 m hkuc

htut cyutli hqatkyuctcup hwicli hyishrasjlut 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].

kcaak 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 Poultrice 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, 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].

nakra 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.

3.2.10 Sorbus americana

American Mountain Ash

2 tlin 6 cyuc 1 kcaak 2 tcan 2 dwat 10 m hkuc

hmimhtut cyutli tcup hwicli hyishrasjlutnyk hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta Sorbus americana is a deciduous Tree growing to 10 m (32ft) by 7 m (23ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from May to June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. 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 The seeds probably contain hydrogen cyanide. This is the ingredient that gives almonds their characteristic flavour. Unless the seed is very bitter it should be perfectly safe in reasonable quantities. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of

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

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[62, 101]. Rich in iron and vitamin C[213, 226]. The fruit is used mainly in making pies, preserves etc, but it can also be eaten raw after a frost because it turns sweeter then[101, 183]. The fruit has a high tannin content and so should only be used in moderation if eaten raw[226]. It can also be dried and ground into a meal[226]. The fruit is produced in dense clusters and is up to 8mm in diameter[200].

tcanta Miscellany Wood Wood - soft, light, close grained, with little strength[82, 229, 235]. It weighs about 34lb per cubic foot[235] and is of no commercial value[229].

dwatta Antiscorbutic Antiseptic Appetizer Astringent Blood purifier Digestive Diuretic Laxative Miscellany Vitamin C The inner bark has astringent and antiseptic properties[213]. It is also used as a blood purifier and appetite stimulant[257]. An infusion is used (sometimes with the terminal buds added) in the treatment of colds, debility, diarrhoea etc[222, 257]. When mixed with sweet flag (*Acorus calamus*) it is used as a tonic[257]. A poultice of the burnt bark has been used in the treatment of boils[257]. The fruit is antiscorbutic, diuretic, mildly laxative, astringent and digestive[226, 257]. It is an ideal accompaniment for foods that are hard to digest[226]. A tea from the berries is antiscorbutic and astringent[213, 222]. It has been used as a rectal wash for piles[213]. It is also used in homeopathic remedies[46, 82].

nrrakta Eastern N. America - Newfoundland to N. Carolina, west to Illinois and Manitoba. ksakta Woods, borders of swamps and rocky hillsides[43, 82] at higher elevations[229].

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]. Tolerates partial shade[188], though it fruits better in a sunny position[K]. Dislikes dry soils[188]. Able to succeed in poor soils and to become established on exposed open ground[229]. A slow-growing and relatively short-lived tree in the wild[229], it fruits freely in Britain[11]. Plants are susceptible to fireblight[188]. 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 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].

3.2.11 *Pinus mugo*

Dwarf Mountain Pine, Mugo pine, Mountain Pine
2 tlin 7 cyut 1 kcaak 0 tcant 2 dwat m hkuc
htut cyuti hgatkuyctupc hwicli hyishrasjlut hpa7tli flatprik hpa7tmwatli dyat hjonli

drutta *Pinus mugo* is an evergreen Tree growing to 4.5 m (14ft) by 8 m (26ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf all year, in flower in June, and the seeds ripen in October. The species

is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. 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: Edible Uses: Condiment A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Dye Essential Herbicide Shelterbelt Soil stabilization Wood A tan or green dye is obtained from the needles[168]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. Trees are sometimes planted as a shelterbelt at high altitudes[185]. There are a number of dwarf forms that are very useful for covering dry slopes and mounds[11]. An essential oil obtained from the young twigs is used medicinally and also in woody perfumeries[7, 46, 61]. Trees are planted for sand binding and shelter in N. Europe[50]. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile[64]. The resins are obtained by tapping the trunk, or by destructive distillation of the wood[4, 64]. In general, trees from warmer areas of distribution give the higher yields[64]. Turpentine consists of an average of 20% of the oleo-resin[64] and is separated by distillation[4, 64]. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc[4]. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc[4]. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc. Wood - used to make shoes etc[46, 61].

dwatta Antiasthmatic Balsamic Cardiotonic Expecto-rant The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge[4]. It is a valuable remedy used internally in the treatment of kidney and bladder complaints and is used both internally and as a rub and steam bath in the treatment of rheumatic affections[4]. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and TB[4]. Externally it is a very beneficial treatment for a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers[4]. The apical branches are antiasthmatic, balsamic, cardiotonic and expectorant[7, 61]. When distilled, the leaves and branches yield an essential oil that is commonly used in pharmaceutical balsamic preparations because of its antiseptic and expectorant qualities[7]. It is used internally and externally in the treatment of upper respiratory tract infections, chronic bronchitis, catarrh and asthma[238]. It is used externally to treat rheumatism and muscular stiffness[238].

nrrakta Europe, from the Alps to S. E. Europe.. ksakta Mountainous regions[13].

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].

nattwa Landscape Uses:Border, Christmas tree, Pest tolerant, Screen, Seashore, Specimen. Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. Thrives in the poorest of soils[11, 200]. Tolerates strong winds[81], including maritime exposure[200]. A polymorphic species, there are many named varieties[11]. 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 forms selected for their ornamental value[188]. Unlike most species of pine, this tree transplants well[11]. 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]. Special Features: Fragrant foliage, Not North American native, Inconspicuous flowers or blooms.

3.2.12 Populus tremula

Aspen Poplar, European aspen, Aspen
2 tin 5 cyuc 1 kcak 3 tcan 2 dwat 18 m hkuc
hmimhtut cyutli tucphja7n hwicli hyishrasjlutnykfrip hpa7tli
flatrpkir hpa7tmwlatli nyanhjen hjonli

drutta Populus tremula is a deciduous Tree growing to 18 m (59ft) by 10 m (32ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 2. It is in flower from February to March, 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. 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 and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil. The plant can tolerates strong winds but not maritime exposure.

kcakta Edible Parts: Inner barkEdible Uses: Inner bark - dried, ground into a powder then added to flour and used for making bread etc[2, 115]. A famine food, it is only used when all else fails[177].

tcanta Charcoal Shelterbelt Soil conditioner WoodA very fast growing and wind resistant tree, it can be planted to provide a shelterbelt[11, 24]. Trees can also be planted to improve heavy clay soils in neglected woodlands[200]. Wood - very soft, elastic, easily split, rather woolly in texture, without smell or taste, of low flammability, not durable, very resistant to abrasion. It makes a high quality paper and is also used to make a very good charcoal[11, 21, 46, 100, 115].

dwatta Anodyne Antiinflammatory Bach Diuretic Expectorant Febrifuge StimulantThe bark and the leaves are mildly diuretic, expectorant and stimulant[9, 165]. The plant is seldom used medicinally, but is sometimes included in proprietary medicines for chronic prostate and bladder disorders[9]. 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]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Vague fears of unknown origin', 'Anxiety' and 'Apprehension'[209].

nrakta Europe, including Britain, from Iceland south and east to N. Africa, temperate Asia to Japan. ksacta Found in open woodlands and scrubby heathland, usually on poorer soils where it is sometimes dominant[17].

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

material wood in November/December in a sheltered outdoor bed. This species is rather difficult from cuttings[11, 113]. Suckers in early spring[78]. Root cuttings in the winter[200].

nattwa A very easily grown plant, it does well in a heavy cold damp soil[1], preferring a neutral to acid soil, and avoiding calcareous soils[11, 24]. The sub-species *P. tremula davidiana*. (Dode.)Schneid. is tolerant of extremely alkaline soils[200]. The species generally 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]. This species grows well on poor soils, probably because of its intolerance of competition[186]. Plants are very tolerant of exposure[24], doing well in cold exposed sites so long as sufficient moisture is present. Plants dislike shade[186], and are intolerant of root or branch competition[200]. A fast growing tree but it is short-lived[186]. Trees produce suckers freely and can form dense thickets[186]. The aspen is a very good wildlife plant, it has over 90 associated insect species[24] and is a food plant for the green hairstreak butterfly[186]. 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]. Can be planted to improve heavy clay soils in neglected woodlands[200]. Dioecious. Male and female plants must be grown if seed is required. Special Features:Not North American native, Wetlands plant, Inconspicuous flowers or blooms.

3.2.13 Convallaria majalis

Lily Of The Valley, European lily of the valley
2 tin 7 cyuc 1 kcak 3 tcan 3 dwat m hkuc
pcimhmimhtut cyutli kyuctcuphja7n hwicli hyishrasjlutnykfr
frip hpa7tli flatrpkirwis hpa7tmwlatli fyfjxre7t hjonli

drutta Convallaria majalis is a PERENNIAL growing to 0.2 m (0ft 8in) 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 May to June, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies. 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 full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers dry moist or wet soil.

pcista All parts of the plant are poisonous[7, 10, 19]. However, the toxic principle is very poorly absorbed when taken orally so poisoning is unlikely to occur[65]. The leaves can be a mild skin irritant[22]. Overdose may lead to nausea, vomiting, stupor, colour perception disorders, and cardiac arrhythmias. Internal use preparations no longer considered safe [301].

kcakta A wine can be prepared from the flowers, mixed with raisins[183].

tcanta Dye EssentialAn essential oil is obtained from the flowers[46, 171]. It is used in perfumery and for snuff[238]. A green dye is obtained from the leaves in spring[13, 14, 115]. A yellow dye is obtained from the leaves in autumn[14]. Plants can be grown as a ground cover in woodland shade or in a shrubbery[200, 208]. As a garden ornamental it has gained the Royal Horticultural Society's Award of Garden Merit.

dwatta Antianxiety Antiarrhythmic Anticonvulsant Antispasmodic Cardiotonic Diuretic Emetic Febrifuge Laxative Poulitice SedativeLily of the valley has a long and proven reputation in herbal medicine in the treatment of heart complaints. It contains the glycosides convallarin and convallamarin which are powerful cardiac tonics and diuretics and are also used in allopathic medicine[244]. However, because of the plants potential toxic properties it should never be used without expert advice[9]. All parts of the plant are antispasmodic, cardiotonic, strongly diuretic, emetic, febrifuge, laxative and sedative[4, 7, 9, 21, 46, 165, 222, 254]. The plant is usually harvested when in flower and can be dried for later use[4], though it is stronger acting when fresh[238]. The inflorescence is said to be the most active medicinally and is often harvested separately[4]. An infusion of the flowers and roots is a digitalis substitute (obtained from Digi-

talis species), though less powerful, that is especially useful in the treatment of valvula heart diseases, cardiac debility, dropsy and chronic lung problems such as emphysema[4, 222, 254]. Lily of the valley encourages the heart to beat more slowly, regularly and efficiently, at the same time it is strongly diuretic, reducing blood volume and lowering blood pressure[254]. Its effect is less cumulative than digitalis which makes it safer for elderly patients[238]. It is often prescribed combined with the fruits of *Crataegus* spp[238]. An ointment made from the roots is used in the treatment of burns and to prevent scar tissue[222]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Convallaria majalis* : Lily Of The Valley for arrhythmia, cardiac insufficiency, nervous heart complaints (see [302] for critics of commission E).

nrakta Europe, including Britain, from Scandinavia to Spain east to N.E. Asia, Greece and the Caucasus. ksacta Dry shady woodland, usually on calcareous soils[7, 13, 17], and especially in ash woodlands[4].

propta Seed - best sown as soon as it is ripe, otherwise in late winter, in a cold frame[164]. Germination, particularly of stored seed can be very slow, taking 2 - 12 months or more at 15°C[164]. Sow the seed thinly so that the seedlings can be allowed to grow on undisturbed in the pot for their first year. Apply a liquid feed during the growing season to ensure that the seedlings are well fed. Divide the young plants into individual pots when they die down in late summer and grow them on in pots in a shady position in a cold frame for at least another year before planting them out into their permanent positions when they are dormant[K]. Division in September[111]. 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:Border, Container, Erosion control, Ground cover, Massing, Specimen, Woodland. garden Succeeds in almost any situation, including the dense dry shade of large trees[1, 4, 24]. Prefers a position in semi-shade in a moderately fertile well-drained moist woodland soil[200, 208]. Grows well in heavy clay, sand or chalky soils[208]. Dislikes pure clay soils and boggy sites[233]. Plants are hardy to -20°C or lower[200]. A polymorphic species[200]. It is a very ornamental plant, though it can become very invasive once it is established[28]. Plants can take a couple of years to become established[208]. There are several named varieties, selected for their ornamental value[233]. The flowers are sweetly scented[245]. Lily of the valley is occasionally cultivated as a medicinal plant for herbalists and allopaths. Plants seem to be immune to the predations of rabbits[233]. A good bee plant[4]. Special Features: Not North American native, Naturalizing, All or parts of this plant are poisonous, Suitable for cut flowers, Fragrant flowers.

3.2.14 *Helianthus decapetalus*

Thinleaf sunflower

2 tlin 8 cyuc 0 ckac 2 tcan 0 dwat 1.2 m hkuc
mmihmtut cyutli tcup hwicli hyishrasljutnyik hpa7tli flatprik
hpa7tmwatli hjonli

drutta *Helianthus decapetalus* is a PERENNIAL growing to 1.2 m (4ft) by 1.2 m (4ft in) at a medium 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, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid and neutral soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

tcanta Cut Flowers or Dried Flowers. Invertebrates shelter: beneficial for insects and other arthropods. Nectary: provides nectar or pollen for beneficial insects [1-2].

nrakta Native to the Eastern and Central United States and Canada, from New Brunswick west to Iowa, Wisconsin, and Ontario, south as far as Georgia and Louisiana. ksacta Open woodlands, woodland borders, savannas, partially shaded areas along rivers, meadows, and thickets. Widespread in beech, maple, and red oak forests, especially at borders and openings.

propta

nwatta An attractive upright rhizomatous perennial wildflower. Prefers partial sun or dappled sunlight, moist to

mesic conditions, and a rich loamy soil. Like other perennial sunflowers, this species may spread aggressively in some situations. Time to full growth: 2 to 5 years. For polyculture design as well as the above-ground 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].

3.2.15 *Caragana frutex*

Russian pea shrub

2 tlin 7 cyuc 0 ckac 2 tcan 0 dwat 1.2 m hkuc
htut cyutli hgatyuctcup hwicli hyishrasljut hpa7tli flatprik
lwis hpa7tmwatli hjonli

drutta *Caragana frutex* is a deciduous Shrub growing to 1.2 m (4ft) by 1.2 m (4ft in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. The flowers are pollinated by Bees, Insects. 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.

kcakta Edible Parts: Seedpod Edible Uses: *Caragana* species are in the Legume Family, and well known for producing edible pods and peas. The pods are cylinder shaped and 2-3 cm long (1"). We could find no reference for this species is edible but it is likely!

tcanta Soil stabilization Agroforestry Uses: The plant is useful for stabilizing soil on slopes[74]. Fixes nitrogen [1-2]. Other uses: Grown as an ornamental in gardens[74].

nrakta Eurasia - European Russia, Ukraine, Moldova, Romania, Bulgaria, Russian Caucasus, western Siberia, Kazakhstan, Kyrgyzstan, western China ksacta Shrub thickets among feather-grass steppes and steppelike meadows, dry slopes, riverside terraces, shore cliffs, forest margins, and mixed or pine forests[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. Cuttings of half-ripe wood, 7 - 10cm with a heel, mid summer in a frame[113]. Layering in spring.

nwatta *Caragana frutex* prefers a continental climate with its hot summers, cold winters and usually a clear movement from one season to another. The dormant plant can tolerate temperatures down to at least -30°C, but in more maritime climates it is often tempted to come into growth early and this new growth can easily be damaged by late spring frosts[200]. Prefers full sun and a light sandy dry or well-drained soil[1, 11, 200]. Does not require a rich soil, succeeding on marginal land[11]. 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]. Profusely-branched, deciduous shrub; it can grow 50 - 150cm tall, occasionally to 300cm[11, 74]. The plant produces long, often erect, supple branches, that are not much divided except near the ends[11]. The plant produces suckers and can spread to form a thicket of growth[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].

3.2.16 *Carex eburnea*

Bristleleaf sedge

2 tlin 8 cyuc 0 kcaak 3 tcan 0 dwat 0.3 m hkuc
pcimhmim cyutli hqatkyuctcup hwicli hyishrasjlutnyik
hpa7tli flatprikhwisslip hpa7tmwatli hjonli

drutta *Carex eburnea* is an evergreen 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. The flowers are pollinated by Wind, 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 and can grow in very alkaline soils. It can grow in full shade (deep woodland) or semi-shade (light woodland). It prefers dry or moist soil and can tolerate drought.

tcanta Ground cover. An attractive first-rate ground cover. Shade and drought tolerant. Good for forest gardens, Rock gardens and shade gardens. An effective accent for smaller gardens. Lawn Alternative.

nrakta Eastern and central North America ksacta Commonly occurs in conifer or mixed forests crevices of limestone bluffs in the Ozark, US. It is also known to grow in drier sandy soils, particularly on limestone outcroppings and glades.

propta Propagate by seed, or clump division in early spring. Can be cut back regularly during its growing season.

nwatta A North American native low maintenance sedge. Prefers a sandy or gravelly soil with a neutral to alkaline pH. Prefers a medium moisture, well-drained soil but will tolerate dry conditions. Very tough tolerating heat and drought. It handles dry conditions best when planted in shade. Light: Sun: Part shade to full shade. USDA Hardiness Zone: 2 to 8. Bloom Time: April. Tolerate: Deer, Heavy Shade. Plants spread slowly by rhizomes. 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 runners away from the plant [2-1].

3.2.17 *Polytrichum commune*

Common haircap, Great golden maidenhair,

2 tlin 10 cyuc 0 kcaak 3 tcan 1 dwat 0.2 m hkuc
pcimhmimhtut cyutli tcupha7n hwicli hyishrasjlutnyik
hpa7tli frusflat hpa7tmwatli hjonli

drutta *Polytrichum commune* is an evergreen Perennial growing to 0.2 m (0ft 8in) by 0.3 m (1ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. The flowers are pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in nutritionally poor soil. Suitable pH: mildly acid soils and can grow in very acid soils. It can grow in full shade (deep woodland) or semi-shade (light woodland) or no shade. It prefers moist or wet soil.

tcanta A low to medium density groundcover with a mat forming habit. An Ornamental for shady, damp areas. It is used by some people to make a tea to dissolve kidney and gall bladder stones (borealforest.org). Good for hair, Made into a tea to rinse to strengthen hair. Stems have been woven and used to make baskets (tolweb.org).

dwatta Used by some people to make a tea to dissolve kidney and gall bladder stones (borealforest.org).

nrakta Widely distributed throughout temperate and boreal latitudes in the Northern Hemisphere and also found in Mexico, several Pacific Islands including New Zealand, and also in Australia. ksacta Typically grows in bogs, wet heathland and along forest streams.

propta Spores. During the summer spores are released and carried by the wind.

nwatta Prefers lightly shaded areas with moist slightly acidic soil, it can also survive in areas of full sunlight provided the soil is moist. Can also grow in areas of poor soil and

slow drainage. For polyculture design as well as the above-ground 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].

4 3 tlin

4.1 bwon

4.1.1 *Hippophae salicifolia*

Willow-Leaved Sea Buckthorn

tf02n 3 tlin 7 cyuc 5 kcaak 5 tcan 3 dwat 15 m hkuc
htut cyutli kyuctcupha7n hwicli hyishrasjlutnyik hpa7tli flatprikhwis 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 tolerates 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 acids[214]. It comes ripe in late summer, though it can be eaten for about a month before this, and will hang on the tree until mid-winter, by which time the flavour has become much milder, though it has also become very soft and difficult to pick[K]. We and many of our visitors really like this fruit, however the flavour is somewhat like a sharp lemon and a lot of people find this too acid for them[K]. It also makes a good salad dressing[K]. The fruits of some species and cultivars (not specified) contain up to 9.2% oil[214]. The fruit is used for making preserves[105, 183]. It is being increasingly used in making fruit juices, especially when mixed with other fruits, because of its reputed health benefits[214]. The fruit becomes less acid after a frost or if cooked[74].

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

dwatta Cancer Cardiac Eczema Poultrice 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 land-slips 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 kca6 5 tcan 5 dwat 6 m hkuc
htut cyutli hgatyuctuphja'n hwicli hyishrasjlutnyik hpa7tli
flatprikliwis 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 expo-

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

dwatta Astringent Cancer Cardiac Eczema Poultice Tonic Vermifuge Vitamin CThe twigs and leaves contain 4 - 5% tannin[240]. They are astringent and vermifuge[7, 100]. The tender branches and leaves contain bio-active substances which are used to produce an oil that is quite distinct from the oil produced from the fruit. Yields of around 3% of oil are obtained[240]. This oil is used as an ointment for treating burns[214]. A high-quality medicinal oil is made from the fruit and used in the treatment of cardiac disorders, it is also said to be particularly effective when applied to the skin to heal burns, eczema and radiation injury, and is taken internally in the treatment of stomach and intestinal diseases[214]. The fruit is astringent and used as a tonic[9, 254]. The freshly-pressed juice is used in the treatment of colds, febrile conditions, exhaustion etc[9]. The fruit is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214]. The juice is also a component of many vitamin-rich medicaments and cosmetic preparations such as face-creams and toothpastes[9]. A decoction of the fruit has been used as a wash to treat skin irritation and eruptions[254].

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

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

nwatta Agroforestry Services: Alley crop Agroforestry Services: Nitrogen Agroforestry Services: Wind-break Fodder: Bank Industrial Crop: Biomass Management Coppice Management: Standard Other Systems: Strip intercrop Staple Crop: OilLandscape Uses:Border, Seashore, Specimen. Succeeds in most soils[200], including poor ones[186], so long as they are not too dry[182, 200]. Grows well by water and in fairly wet soils[182]. Established plants are very drought resistant[186]. Requires a sunny position[3], seedlings failing to grow in a shady position and mature shrubs quickly dying if overshadowed by taller plants[186]. Does well in very sandy soils[1, 186]. Very tol-

Seeds - raw or cooked[194]. It can be eaten with the fruit though the seed case is rather fibrous[160].

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

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

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate in late winter or early spring, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripened 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 CropSucceeds 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 suckering with new plants from underground runners away from the plant [2-1].

4.1.3 *Elaeagnus umbellata*

Autumn Olive
tfo2n 3 tlin 7 cyuc 4 kcaak 3 tcan 2 dwat 4.5 m hkuc
htut cyutli hgatkuyuctup hwicli hyishrasjltutnyik hpa7tli flat-prikwis 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.

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

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

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate in late winter or early spring, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripened 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 CropSucceeds 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].

4.1.4 *Elaeagnus parvifolia*

Autumn olive
tfo2n 3 tlin 7 cyuc 4 kcaak 2 tcan 2 dwat 4.5 m hkuc
htut cyutli hgatkuyuctup hwicli hyishrasjltutnyik hpa7tli flat-prikwis 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

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 underripe it will be quite astringent - though children seem to love it at the slightly unripe stage[K]. The fruit is about 8mm in diameter[200] and contains a single large seed[K]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous.

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

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

nrakta E. Asia - Himalayas. 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%.

4.1.5 *Gymnocladus dioica*

Kentucky Coffee Tree

tfo2n 3 tlin 8 cyuc 3 kcak 0 tcan 2 dwat 20 m hkuc thtut cyutli hgatkycuctcup hwicli hyishrasjltutnyik hpa7tli flat-prikrlwissliphsom 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[K].

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 WoodThe 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 MiscellanyThe 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 pulverized 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. ksacta 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 flying 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.

4.1.6 Shepherdia argentea

Buffalo Berry, Silver Buffaloberry,
tfo2n 3 tin 9 cyuc 3 kcaak 4 tcan 1 dwat 4 m hkuc
hmimhtut cyutli hgatyuctup hwicli hyishrasjlutnyik hpa7tli
flatprikliwis 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. The fruit contains low concentrations of saponins[101]. Although toxic, these substances are very poorly absorbed by the body and so tend to pass through without causing harm. They are also broken down by thorough cooking. Saponins are found in many plants, including several that are often used for food, such as certain beans. It is advisable not to eat large quantities of food that contain saponins. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K].

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[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 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, 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.)

4.1.7 Comptonia peregrina

Sweet Fern

tfo2n 3 tin 6 cyuc 3 kcaak 3 tcan 3 dwat 1.5 m hkuc
hmimhtut cyutli hgatyuctup 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: Com-
ment 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 Astringent Blood purifier Expectorant Febrifuge
Odontalgic Parasiticide Poultrice Tonic Sweet fern was em-
ployed medicinally by several native North American Indian
tribes who used it especially as a poultice to treat a vari-
ety 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 wa-
ter 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].

nrakta Eastern N. America - Nova Scotia south to Geor-
gia and east to Minnesota and Tennessee.. ksakta Dry, ster-
ile, sandy to rocky soils in pinelands or pine barrens, clear-
ings, pastures or edges of woodlots from sea level to 1800
metres[43, 270].

propta Seed - it has a very tough seed coat and also con-
tains germination inhibitors and so is very difficult to ger-
minate[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 per-
centage[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, Ero-
sion control, Foundation, Ground cover, Massing, Rock gar-
den, 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

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].

4.1.8 Trifolium incarnatum

Crimson Clover

tfo2n 3 tlin 9 cyuc 2 kcaak 4 tcan 0 dwat 0.5 m hkuc
htut cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprikliwis
hpa7tmwatli fyifxre7t 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.

kcakta Edible Parts: SeedEdible Uses: TeaThe 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].

tcanta Green manure Soil reclamationUsed 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].

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

propta 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.

nwatta Succeeds in a moist, well-drained circum-neutral soil in full sun[200]. Succeeds in poor soils. The ssp. molinerli 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].

Buttercupss 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.

4.1.9 Caragana pygmaea

Pygmy Peashrub

tfo2n 3 tlin 7 cyuc 1 kcaak 2 tcan 0 dwat 1.2 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli flatprikliwis
hpa7tmwatli xre7t hjonli

drutta Caragana pygmaea is a deciduous Shrub growing to 1.2 m (4ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. 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. 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: RootEdible Uses: Root-cooked[105]. An emergency food, used when all else fails[177].

tcanta Fuel StringThe shoots are very flexible, they are used like string for tying[11]. The wood is used for fuel[146].

nrakta E. Asia - China, Himalayas, Siberia ksacta Desert land at high altitudes with virtually no rain in the growing season, 3600 - 4800 metres[145, 146].

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

nwatta Landscape Uses:Border, Container, Specimen. Prefers full sun and a light sandy dry or very well-drained soil[1, 11, 200]. Does not require a rich soil, succeeding on marginal land[1, 11]. Tolerant of dry alkaline soils. A very ornamental plant[1], it prefers a continental climate with hot summers and cold winters, it does not grow so well in mild maritime areas such as the western half of Britain. 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]. Special Features:Not North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 7 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].

4.1.10 Lotus corniculatus

Bird's Foot Trefoil

tfo2n 3 tlin 8 cyuc 1 kcaak 4 tcan 1 dwat 0.3 m hkuc

but cyutli kyucup hwicli hyishrasjlutnyk hpa7tli flat-prikliw hpa7tmwatli fyifxre7t hjonli

drutta Lotus corniculatus is a PERENNIAL growing to 0.3 m (1ft) by 0.5 m (1ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. 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 Bees. The plant is self-fertile. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate maritime exposure.

pcista All parts of the plant are poisonous, containing cyanogenic glycosides (hydrogen cyanide) [65, 76]. 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. This species is polymorphic for cyanogenic glycosides [218]. The flowers of some forms of the plant contain traces of prussic acid and so the plants can become mildly toxic when flowering [218]. They are completely innocuous when dried [218].

kcakta Edible Parts: Seedpod Edible Uses: The young seedpods are 'nibbled' [177]. Caution is advised, see notes above on toxicity.

tcanta Dye Green manure An orange-yellow dye is obtained from the flowers [74]. A useful green manure plant, fixing atmospheric nitrogen [7]. It is difficult to see this plant as a useful green manure, it is fairly slow growing with us and does not produce much bulk [K].

dwatta Anti-inflammatory Antispasmodic Cardiotonic Carminative Febrifuge Hypoglycaemic Restorative Sedative Tonic Vermifuge Carminative, febrifuge, hypoglycaemic, restorative, vermifuge [178]. The flowers are antispasmodic, cardiotonic and sedative [7]. The root is carminative, febrifuge, restorative and tonic [218]. The plant is used externally as a local anti-inflammatory compress in all cases of skin inflammation [7].

nrakta Europe, including Britain, from Scandinavia south and east to N. Africa and temperate Asia. ksacta Pastures and sunny banks of streams, especially on calcareous soils [7, 13, 17].

propta Pre-soak the seed for 24 hours in warm water and then sow in the spring or autumn in situ. The seed usually germinates in 2 - 4 weeks at 15°C. If seed is in short supply, it can be sown in pots in a cold frame. When they are large enough to handle, prick the seedlings out into individual pots and plant them out in late spring or early summer.

nwatta Landscape Uses: Border, Erosion control, Rock garden. Requires a well-drained soil in a sunny position [200]. Dislikes shade [200]. Does well on poor soils [61]. An important food plant for many caterpillars [30]. It is also a good bee plant [74], the flowers providing an important source of nectar [240]. The flowers are powerfully scented, even though they are able to pollinate themselves [245]. The plant spreads very freely at the roots [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]. Special Features: Attracts butterflies. 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 runners away from the plant [2-1].

4.1.11 Alnus glutinosa

Alder, European alder , Common Alder, Black Alder tfo2n 3 tlin 7 cyuc 0 kcak 5 tcan 3 dwat 25 m hkuc hmimhtut cyutli tcuphja7n hwicli hyisjlutnykfrp hpa7tli flat-prikliw hpa7tmwatli hjonli

drutta Alnus glutinosa is a deciduous Tree growing to 25 m (82ft) by 10 m (32ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf from March to November, in flower from March to April, 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. It can fix Nitrogen. It is noted for attracting wildlife. Suitable for: 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 moist or wet soil. The plant can tolerate maritime exposure.

tcanta Charcoal Dye Hedge Hedge Ink Insecticide Parasiticide Pioneer Shelterbelt Soil reclamation Tannin Teeth WoodTolerant of clipping and maritime exposure, the alder can be grown in a windbreak or a hedge [75]. The trees are very quick to establish [200] and will grow at a rate of 1 metre or more per year when young [K]. This is an excellent pioneer species for re-establishing woodlands on disused farmland, difficult sites etc. Its fast rate of growth means that it quickly provides sheltered conditions to allow more permanent woodland trees to become established. In addition, bacteria on the roots fix atmospheric nitrogen - whilst this enables the tree to grow well in quite poor soils it also makes some of this nitrogen available to other plants growing nearby. Alder trees also have a heavy leaf canopy and when the leaves fall in the autumn they help to build up the humus content of the soil. Alder seedlings do not compete well in shady woodland conditions and so this species gradually dies out as the other trees become established [K]. Because they tolerate very poor soils and also produce nitrogen nodules on their roots, alders are suitable for use in land reclamation schemes. The plants can be used as a source of biomass [269]. According to the phytomass files, annual productivity is estimated at 6 to 9 tonnes per hectare. The tree has yielded 11.8 tonnes per hectare per annum on pulverized fuel ash and annual productivity has been estimated at 8.66 tonnes per hectare, with 5.87 tonnes in wood, bark, and branches, 2.79 tonnes in foliage [269]. Alder has been recommended for consideration for firewood plantations in Tropical highlands where unseasonable cold might destroy the red alder [269]. The powdered bark has been used as an ingredient of toothpastes [9]. Sticks of the bark have been chewed as tooth cleaners [9]. An ink and a tawny-red dye are obtained from the bark [4, 6, 7, 66]. A green dye is obtained from the catkins [4, 6, 66]. A pinkish-fawn dye is obtained from the fresh green wood [4, 6, 66]. A yellow dye is obtained from the bark and young shoots [4, 6, 66]. A cinnamon dye is obtained from the shoots if they are harvested in March [4]. If they are dried and powdered then the colour will be a tawny shade [4]. The bark and the fruits contain up to 20% tannin [46, 61, 223], but they also contain so much dyestuff (imparting a dark red shade) that this limits their usefulness [4, 7]. The leaves are also a good source of tannin [4]. The leaves are clammy and, if spread in a room, are said to catch fleas and flies on their glutinous surface [4, 7]. Wood - very durable in water, elastic, soft, fairly light, easily worked, easily split. It is often used for situations where it has to remain underwater and is also used for furniture, pencils, bowls, woodcuts, clogs etc. It is much valued by cabinet makers [4, 7, 11, 13, 26, 46, 66, 100, 115]. The wood also makes a good charcoal [4, 115].

dwatta Alternative Astringent Cathartic Emetic Febrifuge Galactagogue Haemostatic Parasiticide Skin Tonic Vermifuge The bark is alternative, astringent, cathartic, febrifuge and tonic [4, 7, 14, 46, 269]. The fresh bark will cause vomiting, so use dried bark for all but emetic purposes [21]. A decoction of the dried bark is used to bathe swellings and inflammations, especially of the mouth and throat [4, 9, 21, 254]. The powdered bark and the leaves have been used as an internal astringent and tonic, whilst the bark has also been used as an internal and external haemostatic against haemorrhage [21]. The dried bark of young twigs are used, or the inner bark of branches 2 - 3 years old [9]. It is harvested in the spring and dried for later use [9]. Boiling the inner bark in vinegar produces a useful wash to treat lice and a range of skin problems such as scabies and scabs [21]. The liquid can also be used as a toothwash [21]. The leaves are astringent, galactagogue and vermifuge [7]. They are used to help reduce breast engorgement in nursing mothers [254]. A decoction of the leaves is used in folk remedies for treating cancer of the breast, duodenum, oesophagus, face, pylorus, pancreas, rectum, throat, tongue, and uterus [269]. The leaves are harvested in the summer and used fresh [238].

nrakta Most of Europe, including Britain, to Siberia, W. Asia and N. Africa. ksacta Wet ground in woods, near lakes and along the sides of streams, often forming pure woods n

Use: propra Seed - best sown in a cold frame as soon as it is ripe and only just covered[200]. Spring sown seed should also germinate successfully so long as it is not covered[200, K]. The seed should germinate in the spring as the weather warms up. When large enough to handle, prick the seedlings out into individual pots. If growth is sufficient, it is possible to plant them out into their permanent positions in the summer; otherwise keep them in pots outdoors and plant them out in the spring. There are about 700,000 - 750,000 seeds per kilo, but on average only about 20 - 25,000 plantable seedlings are produced[269]. Seeds can remain viable for at least 12 months after floating in water[269]. Seeds germinate as well under continuous darkness as with normal day lengths. Air-dried seeds stored at 1 - 2°C retained their viability for two years. Seeds can however be sown immediately as soon as ripe[269]. If you have sufficient quantity of seed, it can be sown thinly in an outdoor seed bed in the spring[78]. The seedlings can either be planted out into their permanent positions in the autumn/winter, or they can be allowed to grow on in the seed bed for a further season before planting them. Cuttings of mature wood, taken as soon as the leaves fall in autumn, outdoors in sandy soil.

nwatta Agroforestry Services: Nitrogen Industrial Crop; Biomass Industrial Crop; Tannin Management: Copice Management: Standard Minor Global Crop Other Systems: SRLandscapes Uses: Firewood, Pest tolerant, Pollard, Screen. Prefers a heavy soil and a damp situation[1, 11], tolerating prolonged submergence of its roots and periods with standing water to 30cm deep[186, 200]. Plants can also grow quickly in much drier sites, though they will usually not live for so long in such a position. Alders grow well in heavy clay soils[24, 98], they also tolerate lime and very infertile sites[200]. Tolerates a wide range of soils but prefers a pH above 6[186]. Very tolerant of maritime exposure[49, 75, 166]. Alder is estimated to tolerate an annual precipitation of 40 to 200cm, an annual average temperature of 8 to 14°C and a pH of 6 to 8[269]. The leaves often remain green on the tree until November, or even later on young seedlings. The seeds contain a margin of air-filled tissue and are capable of floating in water for 30 days before becoming waterlogged[186]. This enables distribution of the seed by water. The alder has a very rapid early growth[98], specimens 5 years old from seed were 4 metres tall even though growing in a very windy site in Cornwall[K]. 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[98, 200]. Nitrogen-fixation by trees up to 8 years old has been put at 125 kg/ha/yr., for 20 years at 56 - 130 kg/ha/yr.[269]. Trees often produce adventitious roots from near the base of the stem and these give additional support in unstable soils[186]. Trees are very tolerant of cutting and were at one time much coppiced for their wood which had a variety of uses[4, 186]. Alders are an important food plant for the caterpillars of many butterfly and moth species[30] and also for small birds in winter[24]. There are 90 insect species associated with this tree[24]. There are some named varieties, selected for their ornamental value[200]. Special Features: Not North American native, Naturalizing, Wetlands plant, 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 branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.1.12 *Alnus hirsuta*

tfo2n 3 tlin 7 cyuc 0 kcaak 0 tcan 0 dwat 18 m hkuc
hmimhtut cyutli tucpha7n hwicli hysiljnutnyikfrip hpa7tli flat-
priklwis hpa7tmwatli hjonli
drutta *Alnus hirsuta* is a deciduous Tree growing to 18 m (59ft 1in). See above for USDA hardiness. It is hardy to UK zone 3. 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) and is pollinated by Wind. It can fix Nitrogen. Suitable for: 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 moist or wet soil.

tcanta Charcoal Dye WoodA dye is obtained from the bark[46, 61]. No more details are given. Wood - close grained. Used in turnery and for making charcoal[46, 61].

nrakta E. Asia - Japan, Manchuria ksacta Mountains and hills all over Japan[58].

propra Seed - best sown in a cold frame as soon as it is ripe and only just covered[200]. Spring sown seed should also germinate successfully so long as it is not covered[200, K]. The seed should germinate in the spring as the weather warms up. When large enough to handle, prick the seedlings out into individual pots. If growth is sufficient, it is possible to plant them out into their permanent positions in the summer; otherwise keep them in pots outdoors and plant them out in the spring. If you have sufficient quantity of seed, it can be sown thinly in an outdoor seed bed in the spring[78]. The seedlings can either be planted out into their permanent positions in the autumn/winter, or they can be allowed to grow on in the seed bed for a further season before planting them. Cuttings of mature wood, taken as soon as the leaves fall in autumn, outdoors in sandy soil.

nwatta Prefers a heavy soil and a damp situation[1, 11]. Grows well in heavy clay soils[11]. Tolerates very infertile sites[200]. A polymorphic species[58], it is closely related to *A. incana*[11]. 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]. 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].

4.1.13 *Robinia viscosa*

Clammy Locust, Hartweg's locust
tfo2n 3 tlin 7 cyuc 0 kcaak 3 tcan 0 dwat 13 m hkuc
hmimhtut cyutli hycatkyuctcup hwicli hyishrasjlutnyik hpa7tli
flatpriklwis hpa7tmwatli xre7t hjonli

drutta *Robinia viscosa* is a deciduous Tree growing to 13 m (42ft 8in) 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 Insects. 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. It can tolerate atmospheric pollution.

tcanta Soil stabilizationPlants produce an extensive suckering root system and can be used for soil stabilization on banks etc[229]. The flowers are a rich source of nectar for bees. Wood - heavy, hard, close-grained[82]. The wood weighs 50lb per cubic foot[235].

nrakta South-eastern N. America - Pennsylvania to Alabama. ksacta Dry open woodland and hillside scrub to 1200 metres[184].

propra Seed - pre-soak for 48 hours in warm water and sow the seed in late winter in a cold frame[80]. A short stratification improves germination rates and time[80]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the greenhouse for their first winter. Plant them out into their permanent positions in the following summer. The seed stores for over 10 years[113]. Suckers taken during the dormant season.

nwatta Succeeds in any soil, preferring one that is not too rich[1, 200]. Requires a well-drained soil, succeeding on dry barren sites[184, 200]. Plants are tolerant of drought and atmospheric pollution[200]. Plants prefer a position in full sun, though they also tolerate light shade. A very hardy plant, tolerating temperatures down to at least -25°C when fully dormant[184]. A fast-growing but short-lived species in the wild[229]. The branches are brittle and very liable to wind damage[200]. When plants are grown in rich soils they produce coarse and rank growth which is even more liable to wind damage[11, 200]. Any pruning should be

done in late summer in order to reduce the risk of bleeding[200]. The young branches, seedpods and petioles are covered with dark glandular hairs that exude a clammy sticky substance[82]. Plants sucker freely, especially after coppicing, the suckers have vicious thorns. A very greedy tree, tending to impoverish the soil. 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]. For polyculture design as well as the above-ground 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].

4.1.14 *Alnus serrulata*

Smooth Alder, Hazel alder
tfo2n 3 tlin 9 cyuc 0 kcaak 2 tcan 2 dwat 4.5 m hkuc
htut cyutli tcuphja7n hwieli hysisltnyikfrip hpa7tli flatprikliwis hpa7tmwatli hjonli

drutta *Alnus serrulata* is a deciduous Shrub growing to 4.5 m (14ft 9in). See above for USDA hardiness. It is hardy to UK zone 3. 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: 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 cannot grow in the shade. It prefers moist or wet soil.

tcanta Soil stabilization Trees have extensive root systems and are sometimes planted on the banks of streams in order to prevent erosion[227]. The wood is soft and brittle, weighing 29lb per cubic foot[227]. It is of little commercial value[229].

dwatta Astringent Diuretic Emetic Ophthalmic Purgative A tea made from the bark is analgesic, astringent, blood purifier, diuretic, emetic and purgative[4, 222, 257]. It is used in the treatment of diarrhoea, the pain of childbirth, coughs, toothache and sore mouths[222]. Externally, it is used as an eye wash and a wash for hives, poison ivy rash, piles, swellings and sprains[222]. A decoction of the cones is astringent[4].

nrakta Eastern N. America - Maine to Florida, west to Oklahoma and Indiana. ksacta Moist lowlands, such as swamps, and along ponds and streams where it forms thickets[222, 229].

propta Seed - best sown in a cold frame as soon as it is ripe and only just covered[200]. Spring sown seed should also germinate successfully so long as it is not covered[200, K]. The seed should germinate in the spring as the weather warms up. When large enough to handle, prick the seedlings out into individual pots. If growth is sufficient, it is possible to plant them out into their permanent positions in the summer, otherwise keep them in pots outdoors and plant them out in the spring. If you have sufficient quantity of seed, it can be sown thinly in an outdoor seed bed in the spring[78]. The seedlings can either be planted out into their permanent positions in the autumn/winter, or they can be allowed to grow on in the seed bed for a further season before planting them. Cuttings of mature wood, taken as soon as the leaves fall in autumn, outdoors in sandy soil.

nwatta Prefers a heavy soil and a damp situation[1, 11]. Grows well in heavy clay soils[11]. Tolerates very infertile sites[200]. Requires a position in full sun, dying out when shaded by taller trees[229]. A fast-growing but short-lived tree[229]. This species is closely related to *A. rugosa*[11]. 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]. For polyculture design as well as the above-ground 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]. 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].

4.1.15 *Caragana jubata*

Shag-Spine

tfo2n 3 tlin 7 cyuc 0 kcaak 0 tcan 1 dwat 1 m hkuc
htut cyutli hgatyuctcup hwicli hyishrasljut hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

drutta *Caragana jubata* 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 April to 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. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

tcanta Fibre Hedge Hedge A fibre obtained from the bark is used for making cordage, gunny bags etc[91]. A very spiny plant, it forms an impenetrable barrier and can be grown as a hedge[200].

dwatta Antirheumatic Demulcent Vulnerary Antirheumatic, demulcent, vulnerary. Used in the treatment of boils, swellings, coughs, headaches and rheumatic arthritis[91].

nrakta E. Asia - Siberia to Mongolia and Tibet. ksacta Dry gravel slopes above the sub-alpine forest belt[91].

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

nwatta Prefers full sun and a light sandy dry or well-drained soil[1, 11, 200]. Dislikes damp conditions[1]. Does not require a rich soil, succeeding on marginal land[11]. A very hardy plant but it does not like the lack of sun in British gardens. It is best grown at the foot of a warm dry wall in a well-drained light soil[11]. It prefers a continental climate with hot summers and cold winters[200], it does not flower freely in Britain due to our cooler summers and lack of sunshine[182]. A remarkably curious shrub, but it is not showy[1]. 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].

4.1.16 *Genista sagittalis*

Winged Broom, Arrow Broom

tfo2n 3 tlin 8 cyuc 0 kcaak 3 tcan 0 dwat 0.3 m hkuc
hmimhtut cyutli hgatyuctcup hwicli hyishrasljut hpa7tli flatprikliwslip hpa7tmwatli hjonli

drutta *Genista sagittalis* is a deciduous Shrub growing to 0.3 m (1ft) by 0.9 m (3ft in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. 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

several very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought.

tcanta A good high density groundcover. Nitrogen Fixer. Location: Border, Ground Cover, Mass Planting, Rock Garden, Wildlife Garden, Woodland Garden. A very hardy, mat-forming plant for the rock garden. Invertebrates shelter: beneficial for insects and other arthropods. Nectary: provides nectar or pollen for beneficial insects [1-2].

nrakta Native Range: Southern and central Europe ksacta Dry grasslands, open forests, hillsides and mountain slopes from central Belgium south to southern Spain and east through the Balkans to Greece. Western European broadleaf forest, Atlantic mixed forests and conifer and mixed forests (Pyrenees and Alps). It is also known to occur in mixed forests and montane forests.

propta Seed: Easy. Cover seed and germinate at 55-65F/13-18C. Chipping and soaking may aid germination. Do not transplant. Cuttings taken in summer, or by simple layering. Tip cuttings about 3-6 cm may be taken in mid-summer and rooted in a mist chamber or shaded frame.

nwatta A prostrate, very hardy, sometimes spiny, deciduous shrub or small tree that forms a wide mat of flattened, upright stems. It requires full sun and a very well-drained soil. Soil: Sand, Chalk, Loam. In the wild, it often grow on limestone but in cultivation, it is not too particular about soil pH as long as it is not too acidic. pH: Acid, Alkaline, Neutral. Exposure: Exposed or Sheltered. Upper elevation limit: 2,700 metres. Lower elevation limit: 0 metres. Blooming Period: April in the south to July in the north. For polyculture design as well as the above-ground 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 with a limited spread [1-2].

4.1.17 *Alnus maritima*

Seaside Alder, Beach Alder

tf02n 3 tlin 7 ckcak 0 tcan 0 dwat m hkuc

htut cyutli tcuphja7n hwicli hyisjlutnyikfrip hpa7tli flatprikli-wishsom hpa7tmwatli hjonli

drutta *Alnus maritima* 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 7. It is in flower from September to October, and the seeds ripen in May. 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: 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 saline soils. It cannot grow in the shade. It prefers moist or wet soil.

tcanta Biomass Wood This species has the potential to be used as a biomass crop[269]. Wood - light, soft, close-grained. Light brown in colour with thick, hardly distinguishable heartwood[82].

nrakta Eastern and Central N. America - Delaware, Maryland and Oklahoma. ksacta Along edges of ponds and small streams, often in standing water; from sea level to 100 metres[82, 270].

propta Seed -

nwatta Landscape Uses: Erosion control, Massing. Prefers a heavy soil and a damp situation, but it succeeds in ordinary garden soil[11]. Grows well in heavy clay soils[11]. Tolerates very infertile sites[200]. Trees are tolerant of frost, poor soil, and some salinity and water-logging[269]. Seaside alder is reported to tolerate an annual precipitation in the range of 95 to 400cm, an average annual temperature of 13.5 to 18°C, and a pH in the range of 6.1 to 8.1[269]. This species has a symbiotic relationship with certain soil microorganisms, 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, 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 branching: a heart root, di-

vinging from the crown into several primary roots going down and out [2-1].

4.2 mran

4.2.1 *Tilia x europaea*

Linden, Common Lime

3 tlin 9 cyuc 5 kcak 3 tcan 3 dwat 35 m hkuc

hmimhtut cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprikli-wis hpa7tmwatli xre7t hjonli

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

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

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

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

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

nrakta A hybrid, probably *T. cordata* x *T. platyphyllos*. 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].

Pinus nymphaea 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 × vulgaris* B. Heyne is a synonym of *Tilia × 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 Pinus cembra

Swiss Stone Pine, Swiss Pine, Arolla Pine
3 tlin 9 cyuc 4 kcaak 3 tcan 2 dwat 15 m hkc
hmimhtut cyutli hgatkyuctup hwicli hyishrasjlutnyikfrp
hpa7tli flatprik hpa7tmwatli dyat hjonli

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.

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

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

Pinus cembra Dye: Herbicide Oil Resin Wood Landscaping 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].

Pinus cembra 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].

Pinus cembra 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].

Pinus cembra 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].

Pinus cembra 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

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.

4.2.3 *Rhus glabra*

Smooth Sumach

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

thtut clylly kyucup hwicll hyishrasjlutnyik hpa7tli flatprikkwis 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). It 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 astringent. Root - peeled and eaten raw[161, 183]. This report should be treated with some caution due to possible toxicity[214]. Young shoots - peeled and eaten raw[183, 257]. This report should be treated with some caution due to possible toxicity[214]. The bark has been eaten as a delicacy by children[257]. This report should be treated with some caution due to possible toxicity[214].

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

togogue 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 alterative, antiseptic, astringent, galactogogue, 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[25, 257]. The powdered bark can be applied as a poultice to old ulcers, it is a good antiseptic[4]. A tea made from the roots is appetizer, astringent, diuretic and emetic[222, 257]. An infusion is used in the treatment of colds, sore throats, painful urination, retention of urine and dysentery[257]. The root is harvested in the autumn and dried for later use[254]. An infusion of the green or dried branches has been used in the treatment of TB[257]. A decoction of the branches, with the seed heads, has been used to treat itchy scalps and as a bathing water for frost-bitten limbs[257]. The milky latex from the plant has been used as a salve on sores[257]. A tea made from the leaves was used in the treatment of asthma, diarrhoea and stomatitis[222]. A poultice of the leaves has been used to treat skin rashes[257]. The leaves have been chewed to treat sore gums and they have been rubbed on the lips to treat sore lips[257]. The berries are diuretic, emetic, emmenagogue, purgative and refrigerant[4, 257]. They are used in the treatment of late-onset diabetes, stranguary bowel complaints, febrile diseases, dysmenorrhoea etc[4, 254, 257]. They have been chewed as a remedy for bed-wetting[222, 257]. The blossoms have been chewed as a treatment for sore mouths[257]. A decoction of the blossoms has been used as a mouthwash for teething children[257]. An infusion of the blossoms has been used as an eye wash for sore eyes[257].

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

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

nwatta Landscape Uses: Border, Specimen. Succeeds in a well-drained fertile soil in full sun[11, 200]. Tolerates poor sandy soils[200]. A very hardy plant, when fully dormant it can tolerate temperatures down to at least -25°C[200]. However, the young growth in spring can be damaged by late frosts. A fast-growing but short-lived plant in the wild[229]. Single-stem plants are short-lived in cultivation, but if the plants are coppiced regularly and allowed to form thickets, then they will live longer and also be more ornamental with larger leaves[238]. Any coppicing is best carried out in early spring[238]. It is a very ornamental plant, there are some named varieties[182]. Closely allied to *R. typhina*[11], it hybridizes with that species where their ranges overlap[101, 229]. Plants have brittle branches and these can be broken off in strong winds[200]. Plants are also susceptible to coral spot fungus[11]. Plants in this genus are notably resistant to honey fungus[200]. A good bee plant[K]. Many of the species in this genus are highly toxic and can also cause severe irritation to the skin of some people, whilst other species such as this one are not poisonous. It is relatively simple to distinguish which is which, the poisonous species have axillary panicles and smooth fruits whilst non-poisonous species have compound terminal panicles and fruits covered with

acid crimson hairs[1, 4]. The toxic species are sometimes separated into their own genus, Toxicodendron, by some botanists[200]. Dioecious. Male and female plants must be grown if seed is required. Special Features: Attracts birds, North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

4.2.4 *Rhus aromatica*

Lemon Sumach, Fragrant sumac

3 tlin 9 cyuc 4 kcaak 2 tcan 2 dwat 1.2 m hkuc
htut cyutli hgaktyuctp hwcili hyishrasjlutnyik hpa7tli flat-prikwli hpa7tmwatli nyanhjen hjonli

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

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

kcakta Edible Parts: Fruit Oil Edible Uses: Drink Oil-Fruit - raw or cooked[2, 22]. The fruit is small with very little flesh, but it is easily harvested and when soaked for 10 - 30 minutes in hot or cold water makes a very refreshing lemonade-like drink (without any fizz of course)[61, 85, 183, K]. The mixture should not be boiled since this will release tannic acids and make the drink astringent. The fruit can also be dried and ground into a powder then mixed with corn meal and used in cakes, porridges etc[183].

tcanta Basketry Dye Mordant Oil Soil stabilization Tannin The 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 Dysentery The leaves are astringent and diuretic[61, 222]. They were used in the treatment of colds, stomach aches and bleeding[222]. The root bark is astringent and diuretic[4, 222]. An infusion can be used in the treatment of diarrhoea, dysentery. Used externally, it is used to treat excessive vaginal discharge and skin eruptions and also as a gargle for sore throats[254]. Its use is contraindicated if inflammation is present[222]. The root is harvested in the autumn and dried for later use[254]. The fruits are astringent and diuretic[254]. They have been chewed in the treatment of stomach aches, toothaches and gripe[222] and used as a gargle to treat mouth and throat complaints[254]. They help reduce fevers and may be of help in treating late-onset diabetes[254]. Some caution is advised

in the use of the leaves and stems of this plant, see the notes above on toxicity.

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

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

nwatta Landscape Uses: Border, Erosion control, Foundation, Ground cover, Massing, Seashore, Woodland garden. Succeeds in a well-drained fertile soil in full sun[11, 200]. Tolerates poor soils[169, 200]. Established plants are drought resistant[169]. A very hardy plant when fully dormant, tolerating temperatures down to about -25°C[184]. However, the young growth in spring can be damaged by late frosts. Many of the species in this genus are highly toxic and can also cause severe irritation to the skin of some people, whilst other species such as this one are not poisonous. It is relatively simple to distinguish which is which, the poisonous species have axillary panicles and smooth fruits whilst non-poisonous species have compound terminal panicles and fruits covered with acid crimson hairs[1, 4]. The toxic species are sometimes separated into their own genus, Toxicodendron, by some botanists[200]. This species is a low suckering shrub[182]. There is a specially low growing form, var. *arenaria*, that is found growing on sand dunes in the mid-west of N. America[184]. A polymorphic species[43]. Plants are susceptible to coral spot fungus[11]. Plants have brittle branches that are easily damaged in very strong winds[11]. Plants in this genus are notably resistant to honey fungus[200]. This species transplants easily[169]. The plant has an offensive smell[149]. Or, to go by another nose, the bruised leaves emit a delicious resinous scent[245]. Dioecious. Male and female plants must be grown if seed is required. Special Features: Attracts birds, North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (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].

4.2.5 *Gaultheria procumbens*

Checkerberry, Eastern teaberry, Teaberry, Creeping Wintergreen

3 tlin 6 cyuc 4 kcaak 2 tcan 3 dwat 0.2 m hkuc
pcimhmim cyutli hgaktyuctp hwcili 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.

psista 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. ksacta Sterile woods (poor acid soils) and clearings[43, 62]. Especially found beneath evergreen trees[213].

propta The seed requires a period of cold stratification. Pre-chill for 4 - 10 weeks and then surface sow in a lime-free compost in a shady part of the greenhouse and keep the compost moist[78]. The seed usually germinates well, usually within 1 - 2 months at 20°C, but the seedlings are liable to damp off. It is important to water them with care and to ensure that they get plenty of ventilation. Watering them with a garlic infusion can also help to prevent damping off[K]. Prick out the seedlings into individual pots when they are about 25mm tall and grow them on in light shade in the greenhouse for at least their first winter[K]. Plant them out in late spring or early summer. The seedlings are susceptible to spring frosts so might need some protection for their first few years outdoors. The leaves remain very small for the first few years[11]. Cuttings of half-ripe wood 3 - 6cm

long, July/August in a frame in a shady position. They form roots in late summer or spring[78]. A good percentage usually take. Division can be carried out at almost any time of the year, but works best in the spring just before new growth begins[K]. Very easy, larger clumps can be replanted 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].

4.2.6 Claytonia sibirica

Pink Purslane, Siberian springbeauty
3 tlin 7 cyuc 4 kcak 3 tcan 1 dwat 0.2 m hkuc
pcimhmimhtut cyuti kyuctcup hwic2i hiyhsrasjlutnyik hpa7tli
frusflatprikwis 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: Leaves Edible Uses: Leaves - raw or cooked[2, 62, 183]. They usually have a fairly bland flavour and are quite nice in a salad or cooked as a green vegetable. The leaves have a distinct earthy after-taste rather like raw beetroot[K]. They are available all year round but can turn rather bitter in the summer, especially if the plant is growing in a hot dry position[K]. Although on the small side, the leaves are produced in abundance and are very easily harvested[K].

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

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

nrakta E. Asia - Siberia - Western N. America - Alaska to California. Naturalized in Britain. ksacta Damp woods, shaded stream-sides 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].

4.2.7 *Celtis occidentalis*

Hackberry, Common hackberry

3 tlin 9 cyuc 3 kcaak 2 tcan 1 dwat 20 m hkuc
htut cyuthi hgatyuctup hwicli hyishrasjlut hpa7tli flatprik-
wis 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.

kakta 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].

4.2.8 *Pinus pumila*

Dwarf Siberian Pine

3 tlin 7 cyuc 3 kcaak 3 tcan 2 dwat 3 m hkuc
htut cyuthi hgatyuctup 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].

kakta 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].

4.2.9 *Berberis georgii*

Barberry
3 tlin 7 cyuc 3 kcaak 1 tcan 2 dwat 3 m hkuc
hmimhtut cyutli kyuctcup hwicli hyishrasjlutnyikfrip hpa7tli flatprikliwis hpa7tmwatli fyifxre7t hjonli

drudda *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.

ksakta 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 (Licorice) 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-fruited 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 resprout well from the base[200].

4.2.10 *Berberis vulgaris*

European Barberry, Common barberry
3 tlin 7 cyuc 3 kcaak 4 tcan 3 dwat 3 m hkuc
hmimhtut cyutli kyuctcup hwicli hyishrasjlutnyikfrip hpa7tli flatprikliwis hpa7tmwatli fyifxre7t hjonli

drudda *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. Contraindicated during pregnancy as abortion risk[301].

ksakta Edible Parts: Fruit Leaves Edible Uses: Condiment Tea Fruit - 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 Cholagogue 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 (Liquorice) 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 withdrawal[301].

nrakta Barbary 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]. Hardly 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].

4.2.11 *Mertensia maritima*

Oyster Plant

3 tlin 7 cyuc 3 kcak 0 tcan 0 dwat m hkuc
htut cyutli kyuctcup hwicli hyhshrasjlut hpa7tli flatprikliwis
hpa7twtwli fyfxkre7t hjonli

trutta *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.

kcakta Edible Parts: Flowers Leaves Root 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].

4.2.12 *Amaranthus tricolor*

Chinese Spinach, Joseph's-coat, Fountain Plant, Tampala , Summer Poinsettia

3 tlin 11 cyuc 3 kcak 2 tcan 1 dwat 1 m hkuc
htut cyutli hgattcup hwicli hyishrasjlutnyik hpa7tli frusflat-prikrlwis 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 hardiness. 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 Stem Edible 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 Dye Yellow and green dyes can be obtained from the whole plant[168].

dwatta Astringent The 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 photosyn-

thesize 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].

4.2.13 *Campanula carpatica turbinata*

3 tlin 7 cyuc 3 kcak 2 tcan 0 dwat 0.3 m hkuc
htut cyutli tcup hwicli hyishrasjlut 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 pleasant sweetness[K]. Members of this genus are rarely if ever troubled by browsing deer[233].

4.2.14 *Campanula carpatica*

Tussock Bellflower, Carpathian Bellflower, Carpathian Harebell

3 tlin 8 cyuc 3 kcak 2 tcan 0 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hyishrasjlut hpa7tli flatprikrlwis hpa7tmwatli 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.

kcakta Edible Parts: Flowers Leaves Edible 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].

4.2.15 Larix decidua

Larch, European Larch, Common Larch
3 tlin 6 cyuc 2 kcaok 0 tcan 3 dwat 45 m hkuc
thtut cyutli tcup hwicli hyishrsajut hpa7tli frusflatprikwlis
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 'Dependancy'[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 - low water 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.

Pinus sylvestris 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.

4.2.16 Pinus sylvestris

Scot's Pine, Scotch Pine

3 tlin 7 cyuc 2 kcaak 5 tcan 3 dwat 25 m hkuc
hmmihmtut cyutli hgatkyuctcuphja7n hwicli hyhshrasjlut
hpa7tli frusflatprikhwisslip hpa7tmwatli dyat hjonli

Pinus sylvestris is an evergreen tree growing to 25 m (82ft) by 10 m (32ft) 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 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.

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

Edible Parts: Inner bark Edible Uses: Condiment Inner 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].

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 smoky[6, 66, 115].

Antirheumatic Antiseptic Aromatherapy Bach Balsamic Diuretic Expectorant Scot'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].

Europe, including Britain, from Scandinavia south and east to Spain, Albania and temperate Asia. ksact Forming woods in the mountains of Scotland[7, 9].

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].

Industrial Crop: Hydrocarbon Management:

Regional Timber Landscape 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.

4.2.17 Pinus strobus

White Pine, Eastern white pine
 3 tlin 7 cyuc 2 kcaok 0 tcan 3 dwat 20 m hkuc
 thtut cyutli hqatkyuctup hwicli hyishrasjlut hpa7tli flatprik
 hpa7tmywatli dyat hjnli

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 discomfort [301].

kcaakta Edible Parts: Flowers Inner bark Seed
 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.

tcaanta Dye Gum Herbicide Miscellany Pitch Waterproofing Wood
 A tan or green dye is obtained from the needles[168]. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat[201]. 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 C
 White 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 [209] 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.

4.2.18 *Picea pungens*

Blue Spruce, Colorado Spruce
3 tlin 7 cyuc 2 kcaok 0 tcan 0 dwat 20 m hkuc
htut cyutli kyuctcup hwicli hyshrasj|lutnyik hpa7tli frusflat-
prik hpa7tmwatli 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.

kcka *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 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 Wood A 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. 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]. 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.

4.2.19 *Picea engelmannii*

Mountain Spruce, Engelmann spruce

3 tlin 7 cyuc 2 kcaok 0 tcan 2 dwat 20 m hkuc
htut cyutli tcuphja7n hwicli hyshrasj|lutnyik 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 hardiness. 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.

kcka *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 Wood The 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 C An 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 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[1], 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].

4.2.20 *Betula platyphylla*

White Birch, Asian white birch,
3 tlin 6 cyuc 2 kcaak 2 tcan 2 dwat 20 m hkuc
htut cywtli kyuctup hwicli hyishrasjlytnyikfrip hpa7tli flat-prikri hpa7mwtwli 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. ksacta 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.

4.2.21 *Pinus aristata*

Bristle-Cone Pine
3 tlin 10 cyuc 2 kcaak 2 tcan 2 dwat 12 m hkuc
htut cywtli hgatkuyctup hwicli hyishrasjlyt hpa7tli flat-prikri hpa7mwtwli 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].

kcaakta Edible Parts: SeedEdible Uses: CondimentSeed - 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 WoodLandscape 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.

4.2.22 *Betula populifolia*

Grey Birch

3 tlin 6 cyuc 2 kcaak 3 tcan 1 dwat 12 m hkcuc

thut cyutli kyuctcup hwicli hyishrsajlutnyikfrip hpa7tli flat-prikwis hpa7mwatli 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 SapEdible 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 WoodA 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-grained, soft, light, weak, not durable[61, 82, 229, 235]. It weighs 36lb per cubic foot[235]. Unimportant commercial, the wood is used locally for making clothes pegs, spools, pulp, charcoal and quite commonly as a fuel[61, 82, 229].

dwatta Antiseborrheic Astringent UrinaryThe 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

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.

4.2.23 Viburnum prunifolium

Stagberry, Black Haw, Hybrid blackhaw, Smooth Blackhaw, Blackhaw Viburnum

3 tlin 9 cyuc 2 kcaok 0 tcan 3 dwat 7.5 m hkuc
hmimhtut cyutli kyuctcup hwicli hyishrasjlutnyik hpa7tli flat-prikklwis 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].

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[2, 5, 55, 62, 200, 257]. A thin dry flesh with a sweet taste[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.

4.2.24 Cotoneaster racemiflorus

Black-Wood, Cotoneaster

3 tlin 7 cyuc 2 kcaok 2 tcan 1 dwat 2.4 m hkuc
hmimhtut cyutli kyuctcup hwicli hyishrasjlutnyikfrip hpa7tli flatprikklwisslip hpa7tmwatli xre7t 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

birds[200]. Trees are notably susceptible to honey fungus[200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.2.25 Eleutherococcus senticosus

Siberian Ginseng

3 tlin 7 cyuc 2 kcaak 0 tcan 5 dwat 2 m hkuc
hmmimhtut cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprik-
wis 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: Leaves Edible Uses: Tea Young leaves and buds - cooked [105, 177]. The dried leaves are used as a tea substitute [105, 177].

dwatta Adaptogen Antiinflammatory Hypoglycaemic Tonic Vasodilator Siberian 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].

4.2.26 Grindelia squarrosa

Rosin Weed, Curlycup gumweed

3 tlin 7 cyuc 2 kcaak 0 tcan 3 dwat 1 m hkuc
htut cyutli hgatyuctup hwicli hyishrasjlut hpa7tli flatprik-
wis 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].

kcakta 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 Expectorant Homeopathy Poultice 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].

4.2.27 Aralia hispida

Bristly Sarsaparilla

3 tlin 7 cyuc 2 kcak 2 tcan 1 dwat 1 m hkuc
hmmihtut cyutli kyuctcup hwicli hyishrasjlutnyik hpa7tli flat-
priklwis 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 TeaA 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 TonicA tea made from the leaves is diaphoretic[222]. The root is alterative 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 alterative, 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. ksacta 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].

4.2.28 Dryopteris filix

Male Fern

3 tlin 8 cyuc 2 kcak 0 tcan 4 dwat 1.2 m hkuc
hmmihtut cyutli hgatkyuctcup hwicli hyishrasjlutnyik hpa7tli flat-
priklwis 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 hardiness. 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.

kcakta Edible Parts: Leaves RootEdible 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 TanninA 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 Antiinflammatory Antirheumatic Antiviral Astringent Febrifuge Vermifuge VulneraryThe male fern is one of the most popular and effective treatments for tape worms. The root stalks are anodyne, antibacterial, anti-inflammatory, antiviral, astringent, febrifuge, vermifuge and vulnerary[7, 9, 13, 19, 21, 171, 178, 218, 238]. The root contains an oleoresin that paralyses 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, *Convolvulus 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. ksacta 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.

4.2.29 Solidago odora

Swेत Goldenrod, Anise-scented goldenrod, Chapman's goldenrod

3 tlin 7 cyuc 2 kcaak 2 tcan 2 dwat 1.2 m hkuc
hmmihmtut cyutli kyuctcup hwicli hyishrasjlutnyikfrrip 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 SeedEdible Uses: Condiment TeaLeaves - 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 EssentialAn anise-scented essential oil is obtained from the plant[61]. It is used medicinally[207] and in perfumery - especially for scenting 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 UrinaryAn 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].

4.2.30 Leonurus cardiaca

Motherwort, Common motherwort

3 tlin 7 cyuc 2 kcaak 0 tcan 3 dwat 1 m hkuc
hmmihmtut cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprikliwis hpa7tmwatli xre7t 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.

pcista 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 Astringent Birthing aid Cardiac Diaphoretic Emmenagogue Homeopathy Nerve 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, astringent, cardiac, diaphoretic, emmenagogue, nerve, 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].

4.2.31 Chrysothamnus viscidiflorus

Green Rabbitbrush, Yellow rabbitbrush

3 tlin 7 cyuc 2 kcaak 2 tcan 1 dwat 1 m hkuc
htut cyutli hgatykyuctcup hwicli hyishrasjlut hpa7tli flatprikliwislip 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 GumA 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 LatexThe 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 PoulticeA 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].

4.2.32 *Polypodium vulgare*

Polypody, Adders Fern, Golden Maidenhair Fern, Wall Fern, Common Polypod Fern

3 tlin 6 cyuc 2 kcak 3 tcan 3 dwat 0.3 m hkuc
pcimhmim cyutli kyuctcup hwicli hyishrasjlutnyikfrip hpa7tli flatprkrlwis 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 TonicPolyody 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].

nwatta 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 hardiness 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].

4.2.33 *Artemisia frigida*

Fringed Wormwood, Prairie sagewort
3 tlin 10 cyuc 2 kcak 3 tcan 2 dwat 0.3 m hkuc

htut cyuti hqyuctcup hwicli hyishrasjlut hpa7tli flatprikwlis 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].

kcakta Edible Parts: Edible Uses: CondimentThe leaves are used by the Hopi Indians as a flavouring for sweet corn[61, 172, 177, 183, 257].

tcanta Deodorant Disinfectant Dye Essential RepellentBoth 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 Poultice Stimulant Stomachic Vermifuge Women's complaintsThe 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].

nwatta 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].

4.2.34 *Achillea ptarmica*

Sneeze-Wort, Sneezeweed

3 tlin 9 cyuc 2 kcak 2 tcan 1 dwat 0.6 m hkuc htut cyuti tcup hwicli hyishrasjlutnyik hpa7tli flatprikwlis hpa7tmwatli fyfxre7t 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].

4.2.35 *Equisetum arvense*

Field Horsetail

3 tlin 11 cyuc 2 kcak 4 tcan 3 dwat 0.6 m hkuc hmimhtut cyuti kyuctcup hwicli hyishrasjlutnyik hpa7tli flatprikwlis 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 sub-

stance 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]. 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 modules[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, antihæmorrhagic, antiseptic, astringent, carminative, diaphoretic, diuretic, galactogogue, hæmostatic 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 equisetinic 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, includ-

ing 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].

4.2.36 *Elymus canadensis*

Canadian Wild Rye

3 tlin 7 cyuc 2 kcaok 0 tcan 0 dwat 0.8 m hkuc
htuc cyuti hgatquc hwicli hyishrasljutnyk hpa7tli flatprik-
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.

kcakta 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].

4.2.37 *Pinus radiata*

Monterey Pine

3 tlin 11 cyuc 1 kcaok 3 tcan 2 dwat 65 m hkuc
htuc cyuti hgatqyuctup hwicli hyishrasljut hpa7tli flatprik-
hpa7tmwatli dyat hjonli

drutta *Pinus radiata* is an evergreen Tree growing to 65 m (213ft) by 10 m (32ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 8. It is in leaf all year, in flower from February to March, 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

der when young[11]. Any transplanting is best done when the plant is in active growth in the summer. Only small plants should be moved[200]. Extensively cultivated for timber in warm temperate zones, especially in New Zealand, it grows larger in cultivation than it does in the wild[200]. It is a very vigorous tree in S.W. England[11] where growth takes place almost all year round and annual height increases of 2.5 metres in young plants are not uncommon[185]. Outside the milder areas growth is less vigorous, taking place from June to September[185]. A short-lived tree in the wild, where it rarely lives longer than 100 years[81]. It is probably going to be long-lived in cultivation in Britain[185]. It often self-sows in Britain, though the seedlings are usually found in the shade of the tree and do not flourish there[185]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. The cones are 8 - 17cm long[82], they remain closed on the tree for many years, only opening after the heat of a forest fire followed by rain[200]. Plants can produce new shoots from reasonably old wood so the lower branches can be cut back to produce a hedge-like effect[11]. 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]. Special Features: Attracts birds, North American native, Inconspicuous flowers or blooms.

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4.2.38 Pinus nigra

Austrian Pine, Black Pine

3 tlin 7 cyuc 1 kcak 0 tcan 2 dwat 30 m hkuc

htut cyutli hgatyuctup hwlici hysirasjlutnyik hpa7tli flat-prikhwlslip hpa7tmwatli dyat hjonli

drutta Pinus nigra is an evergreen Tree growing to 30 m (98ft) by 8 m (26ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. It is in leaf all year, in flower from May to June, and the seeds ripen 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), 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.

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

kcakta Edible Parts: Edible Uses: CondimentA vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood[200].

tcanta Dye Herbicide Plaster 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 very wind resistant tree, it can be grown as part of a shelterbelt planting[200]. Trees have proved to be very resistant to maritime exposure on our Cornwall trial grounds[K]. Resin and turpentine are obtained from the wood, they are used in ointments and plasters[46, 64, 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. Wood - non durable. Used for rough carpentry and furniture[100].

dwatta PlasterThe 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

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 South-western N. America - California. ksacta Found only in a narrow belt a few kilometres wide near the California coast, in dry bluffs and slopes below 300 metres[71, 82].

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

nwatta Industrial Crop: Hydrocarbon Management: Standard Regional TimberLandscape Uses:Screen, Specimen. Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. Very resistant to maritime exposure[75], the leaves can be badly burned by cold dry winds but this does not seem to affect growth[11]. Mature trees produce a broad heavy crown and are somewhat likely to be blown down in severe gales[200]. Trees are somewhat ten-

rhumatic affections[4]. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and TB[4]. Externally it is a very beneficial treatment for a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers[4].

nrakta Europe - Austria. ksacta Mountains, often on calcareous soils[100].

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:Firewood, Specimen. Succeeds on all soil types, including chalk[1, 11, 200]. Thrives in a light well-drained sandy or gravelly loam[1, 11]. Dislikes poorly drained moorland soils[1]. Established plants tolerate drought[200]. Requires a sunny position[11]. A very hardy tree, it is extensively planted for timber and shelter[50, 200], tolerating maritime exposure[11, 75]. Fast growing when young, it outgrows the Corsican pine (*P. nigra maritima*) for the first 5 or 6 years but is then rapidly overtaken by that species[185]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. Leaf secretions inhibit the germination of seeds, thereby reducing the amount of plants that can grow beneath the tree[18]. Trees tend to be short-lived in cultivation[11]. Plants in this genus are notably susceptible to honey fungus[200]. Special Features: Not North American native, Inconspicuous flowers or blooms.

4.2.39 *Symphoricarpos albus laevigatus*

Snowberry

3 tlin 7 cyuc 1 kcaok 2 tcan 2 dwat 3 m hkcuc
pcimhmihmtut cyutli kyuctpoc hwicly hyshrasjlutnyikfrip
hpa7tli flatprikwis hpa7tmwattli xre7t hjonli

drutta *Symphoricarpos albus laevigatus* 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. It is in flower from July to September, and the seeds ripen from September to November. 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 and nutritionally poor 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 or moist soil. The plant can tolerate maritime exposure. It can tolerate atmospheric pollution.

pcista The fruit contains saponins. 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 but it would take extremely large doses of many kilos of fruit from this plant in order to produce toxic symptoms[65]. 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].

ksakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[2, 105, 161]. An insipid flavour, it is best if cooked[177]. The fruit is rather boring[K]. The fruit is about 15mm in diameter[200]. See the notes at top of page regarding possible toxicity.

tcanta Broom Cosmetic Disinfectant Hair Hedge Hedge Soap Soil stabilizationPlants have extensive root systems and are used to stabilize soils on banks and slopes[200]. The branches can be tied together and used as a broom[99, 257]. The berries contain saponins and have been used as a hair wash[257]. A mild decoction of the wood has been used as a cleansing wash for babies[257]. The crushed berries have been rubbed into the armpits as an antiperspirant[257]. Very tolerant of trimming, it can be grown as a medium to tall hedge[29]. Its main drawback as a hedge is its propensity to sucker[K].

dwatta Disinfectant Diuretic Febrifuge Laxative Ophthalmic Poultice Salve Skin Stomachic TB VD WartsSnowberry was commonly employed medicinally by several native North American Indian tribes who valued it especially for the saponins it contains. These saponins can be toxic, but when applied externally they have a gentle cleansing and healing effect upon the skin, killing body parasites and helping in the healing of wounds. The native Americans used it to treat a variety of complaints but especially as an external wash on the skin[257]. The plant is little, if at all, used in modern herbalism. Any internal use of this plant should be carried out with care, and preferably under the supervision of a qualified practitioner. See the notes above on toxicity. The whole plant is disinfectant, diuretic, febrifuge and laxative[257]. An infusion of the stems has been drunk to treat stomach problems and menstrual disorders[213]. A decoction of the leaves has been used in the treatment of colds[257]. A poultice of the chewed leaves has been applied, or an infusion of the leaves has been used as a wash, in the treatment of external injuries[257]. A weak solution of the stems and leaves has been used as a wash for children whilst a stronger solution is applied to sores[213]. The fruit has been eaten, or used as an infusion, in the treatment of diarrhoea[257]. An infusion of the fruit has been used as an eye wash for sore eyes[257].The berries have been rubbed on the skin as a treatment for burns, rashes, itches and sores[257]. The berries have also been rubbed on warts in order to get rid of them - this treatment needs to be carried out at least three times a day for a period of a few weeks[257]. A poultice of the crushed leaves, fruit and bark has been used in the treatment of burns, sores, cuts, chapped and injured skin[257]. An infusion of the roots has been used in the treatment of fevers (including childhood fevers), stomach aches and colds[257]. A decoction of the root bark has been used in the treatment of venereal disease and to restore the flow of urine[257]. An infusion of the root has been used as an eyewash for sore eyes[257]. An infusion of the whole plant has been drunk and also applied externally in the treatment of skin rashes[257]. A decoction of the roots and stems has been used in the treatment of the inability to urinate, venereal disease, tuberculosis and the fevers associated with teething sickness[257].

nrakta Western N. America. Naturalized in Britain[17]. ksacta Banks and flats in canyons and near streams below 1200 metres in California[71].

propta Seed - best sown as soon as it is ripe in a cold frame. Stored seed requires 3 months warm then 5 months cold stratification[98]. 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, July/August in a frame[113]. Cuttings of mature wood, 15 - 25cm long preferably with a heel, in a sheltered bed outdoors in winter. High percentage[78, 200]. Division of suckers in winter. They can be planted straight Tu into their permanent positions.

nwatta Tolerates most soils and conditions, including poor soils and amongst the roots and under the drip of trees[11, 200]. Grows well in heavy clay soils. Prefers a well-drained soil[200]. Does well in sun or shade[1]. Tolerates urban pollution and maritime exposure[200]. A very hardy plant, tolerating temperatures down to about -40°C[200]. A very ornamental but invasive plant, spreading by means of suckers[1, 11]. Its flowers are much visited by bees and the fruit is very attractive to wild life[1, 94]. There are some named varieties, developed for their ornamental

value[11]. 'Constance Spry' bears a copious crop of large round berries. Plants in this genus are notably resistant to honey fungus[200].

4.2.40 *Anaphalis margaritacea*

Pearly Everlasting, Western pearly everlasting
3 tlin 7 cyuc 1 kcaak 0 tcan 2 dwat m hkuc
hmmihtut cyutli kyuctcup hwicli hyishrasljut hpa7tli flatprikli-wis hpa7tmwatli nyanhjen hjonli

drutta *Anaphalis margaritacea* is a PERENNIAL growing to 0.9 m (3ft) 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 in August, 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. The plant is not self-fertile. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: LeavesEdible Uses: Young leaves - cooked[105, 177].

tcanta Dye IncenseYellow to gold, also green and brown dyes can be obtained from the flowers, stems and leaves combined[168]. The leaves, flowers and stems have been used as an incense, especially in baby cradles[257].

dwatta Anodyne Antiseptic Astringent Dysentery Expectorant Poulitice SedativePearly everlasting was often employed medicinally by native North American Indian tribes who used it in the treatment of a range of ailments[257]. It is little used in modern herbalism. The whole plant is anodyne, antiseptic, astringent, expectorant and sedative[4, 61, 168, 222]. Used internally, it is a good remedy for diarrhoea, dysentery and pulmonary affections[4]. A poultice of the flowers or the whole plant is applied to burns, sores, ulcers, bruises, swellings and rheumatic joints[4, 222, 257]. An infusion of the plant is steamed and inhaled in the treatment of headaches[257]. a cooled infusion of the roots and shots has been used as a laxative and emetic to treat 'poison stomach'[257].

nrakta N. America. N.E. Asia. Naturalized in Britain. ksakta Moist meadows, by rivers, on wall tops and in sandy and waste places[17].

propta Seed - sow spring in a cold frame[1, 133]. The seed is best sown when it is ripe in the autumn. It usually germinates in 4 - 8 weeks at 15°C[133]. 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 them out into their permanent positions in late spring or early summer, after the last expected frosts. Division is very easy at almost any time of the year; the divisions can be planted straight into their permanent positions if required.

nwatta Prefers a light well-drained soil and a sunny position[1, 133]. Requires a moist soil[208]. Succeeds in most soils[200], including poor ones[1], and also in light shade[200]. Succeeds in the shade of buildings, but not of trees[233]. Plants are hardy to about -25°C[187]. The flowering stems can be dried and used as everlasting flowers[212]. Plants seem to be immune to the predations of rabbits[233]. Dioecious. Male and female plants must be grown if seed is required.

4.2.41 *Artemisia gmelinii*

Russian Wormwood, Gmelin's wormwood
3 tlin 7 cyuc 1 kcaak 0 tcan 1 dwat 1.5 m hkuc
htut cyutli hgatykyuctcup hwicli hyishrasljutnyik hpa7tli flatprikli-wis hpa7tmwatli xre7t hjonli

drutta *Artemisia gmelinii* is a PERENNIAL growing to 1.5 m (5ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from August to October, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, 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].

kcakta Edible Parts: LeavesEdible Uses: One report says that the plant is edible but gives no more details[177].

tcanta The plant yields 1% essential oil, which contains 19% essential oil, 6% camphor[240].

dwatta HepaticThe leaf and stem are used in Korea to treat hepatitis, hyperlipaemia and infected cholecystitis[279]. The plant contains flavonoids, sesquiterpenes and other bio-active constituents, though no bio-activities have been recorded scientifically[279].

nrakta Eastern Europe to Central Asia, China, Mongolia and Korea. ksakta Dry stony slopes, especially in Ladakh and Lahul, 2100 - 4200 metres[51]. Hills, steppe, semidesert steppe, meadows, rocky slopes, scrub, dry floodlands, wastelands; 1500-4900 m[266].

propta Seed - surface sow from late winter to early summer in a greenhouse, making sure that the compost does not dry out[200]. When large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant out in late spring or early summer. Division in spring or autumn[200]. 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 Easily grown in a well-drained circumneutral or slightly alkaline loamy soil, preferring a warm sunny dry position[1, 200]. Established plants are drought tolerant[200]. Plants are longer lived, more hardy and more aromatic when they are grown in a poor dry soil[245]. This species is closely related to *A. sacrorum* and often confused with that species[266]. We are not sure if this plant is annual, biennial or perennial, since various reports differ. Members of this genus are rarely if ever troubled by browsing deer[233].

4.2.42 *Armeria maritima*

Sea Thrift, Thrift seapink, California seapink, Interior seapink, Siberian sea thrift

3 tlin 9 cyuc 1 kcaak 0 tcan 1 dwat m hkuc
htut cyutli hgatykyuctcup hwicli hyishrasljut hpa7tli flatprikli-wishsom hpa7tmwatli xre7t hjonli

drutta *Armeria maritima* is an evergreen Perennial growing to 0.1 m (0ft 4in) by 0.2 m (0ft 8in) at a slow 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 June to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, beetles, Lepidoptera (Moths and Butterflies). 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 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: Leaves RootEdible Uses: Leaves - cooked[177]. Used for slimming[61]. Root[69]. No more details are given[69].

tcanta A good ground-cover for a sunny position[200]. The cultivar 'Vindictive' has been especially recommended[188] and so has 'Alba'[190]. Plants form a slowly spreading carpet[208].

dwatta UrinarySea thrift is rarely used in herbal medicine, though the dried flowering plant is antibiotic and has been used in the treatment of obesity, some nervous disorders and urinary infections[268]. It cannot be used externally as an antibiotic poultice because it can cause dermatitis or local irritation[268].

nrakta W. Europe, including Britain, from Iceland to N. Spain. ksakta Coastal salt marshes, pastures and maritime cliffs[17]. Dry, sandy, somewhat acidic soils in sandy turf, coastal salt marshes, cliffs and mountain pastures[268].

propta Seed - pre-soak for 8 hours in warm water and then sow in pots of sandy soil in a cold frame. Germination usually takes place in 2 - 3 weeks 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, transplanting them out in late spring or early summer. Division in spring or after flowering[111]. Fairly easy, large divisions can be planted out straight into their permanent positions whilst it is probably best to pot up smaller divisions and to grow them on in light shade in a cold frame until they are rooting well.

nwatta Landscape Uses:Alpine garden, Border, Container, Massing, Rock garden, Seashore, Specimen. Succeeds in most soils including clay and poor sands[200]. Prefers a well-drained sandy soil with added leaf mould and a sunny position[1, 111, 134]. Requires an acid soil according to one report[24] whilst others say that it dislikes acid soils. Plants are very wind-tolerant and succeed in maritime gardens[233]. Established plants are drought tolerant[190]. Succeeds when grown at the top of a retaining wall or a cavity wall[219]. The plant tolerates light treading[200]. It forms a slowly expanding clump and makes a good edging plant[111]. A good butterfly plant[24, 30]. The flower is a symbol of sympathy, used at funerals[66]. Special Features: North American native, Suitable for cut flowers.

4.2.43 *Artemisia sacrorum*

Russian Wormwood

3 tlin 7 cyuc 1 kcaak 0 tcan 0 dwat 1 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlutnyik hpa7tli flatprik
lwis hpa7tmwatli xre7t hjonli

drutta *Artemisia sacrorum* 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 August to October, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, 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].

kcaak Edible Parts: LeavesEdible Uses: One report says that the plant is edible but gives no more details[177].

nrakta E. Asia - from Afghanistan to India, Tibet, China and Mongolia. ksacta Widespread throughout China on hills, waysides, shrublands, slopes (where it is often dominant on southern slopes), roadsides and forest steppe from low to middle elevations[266].

propta Seed - surface sow from late winter to early summer in a greenhouse, making sure that the compost does not dry out[200]. When large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant out in late spring or early summer. Division in spring or autumn[200]. 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 Easily grown in a well-drained circumneutral or slightly alkaline loamy soil, preferring a warm sunny dry position[1, 200]. Established plants are drought tolerant[200]. Plants are longer lived, more hardy and more aromatic when they are grown in a poor dry soil[245]. This species is closely related to *Artemisia gmelinii* and is often confused with that species[266]. We are not sure if this plant is annual, biennial or perennial, since various reports differ. Members of this genus are rarely if ever troubled by browsing deer[233].

4.2.44 *Berberis koreana*

Korean Barberry, Barberry

3 tlin 7 cyuc 1 kcaak 0 tcan 2 dwat 1.5 m hkuc
hmmihtut cyutli kyuctcup hwicli hyishrasjlutnyikfrp hpa7tli
flatprikwis hpa7tmwatli fyifxre7t hjonli

drutta *Berberis koreana* is a deciduous Shrub growing to 1.5 m (5ft) 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. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects.

The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcaak Edible Parts: Fruit LeavesEdible Uses: Fruit - raw or cooked. The fruits are about 5mm long[200]. Young leaves - cooked[177].

tcanta DyeA yellow dye is obtained from the root.

dwatta Antibacterial Cancer DysenteryBerberine, 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].

nrakta E. Asia - Korea. ksacta Hedgerows, ledges and montibus[11, 67].

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 Landscape Uses:Erosion control, Pest tolerant, Hedge, Massing, Screen, Superior hedge, Woodland garden. Prefers a warm moist loamy soil and light shade but it is by no means fastidious, succeeding in thin, dry and shallow soils[11, 200]. Grows well in heavy clay soils. A very hardy plant, tolerating temperatures down to about -30°C[200]. Plants can be pruned back quite severely, they sprout well from the base[200]. Very stoloniferous, plants produce suckers freely[67, 200]. A very ornamental plant[67], it is closely related to *B. vulgaris*[1]. Hybridizes freely with other members of this genus[1]. The flowers are produced late in spring, thereby escaping spring frosts[67]. Special Features: Not North American native, Inconspicuous flowers or blooms.

4.2.45 *Coreopsis verticillata*

Whorled tickseed

3 tlin 9 cyuc 1 kcaak 3 tcan 1 dwat 1 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli flatprik
hpa7tmwatli hjonli

drutta *Coreopsis verticillata* is a PERENNIAL growing to 1 m (3ft 3in) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. 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.

kcaakta Edible Parts: FlowersEdible Uses: Edible flowers [318-1].

tcanta Soil stabilizationGroundcover. A good medium to high density fast growing groundcover [1-2]. Erosion Control. Ornamental: Good in flower beds, borders, mass plantings, entrance ways, foundations, raised planters, and naturalized sunny areas. A good plant for areas with poor, dry soils. Container Garden. Cut Flower. Insectory:Long flowering period attracts butterflies. [318-1].

dwatta DiureticDiuretic [318-1].

nrakta Found primarily in the east-central United States, from Maryland south to Georgia, with isolated populations as far west as Oklahoma and as far north as Québec and Ontario. ksacta Open rocky dry woods, open pineland, margins of woods, pine savannahs and post oak savannahs.

propta Propagation is by seed or division of the rhizomes.

nwatta A hardy herbaceous rhizomatous perennial. It can tolerate drought, poor soil, extreme heat, and neglect. Life Span: Short-Lived Perennial. Stand Persistence: Long. Form: Clump. Texture: Fine. Sun: Full Sun. Soil Type: Sandy, Loamy, Silty. Soil Moisture: Moderate, Dry. Soil pH: 6.5 - 7.5. Root Type: Rhizome. Seasonal Interest: Summer-Fall. Notes: Spreads via rhizome, forms a dense clump. Seeds resemble ticks, hence the name. Cultivars available. The following notable cultivars have all gained the Royal Horticultural Society's Award of Garden Merit: 'Grandiflora' - taller than other cultivars, with slightly larger flowers. 'Moonbeam' - pale, sulphur-yellow flowers, slightly shorter growth. 'Zagreb' - shorter than the species, bright yellow flowers. Flower Color: Yellow. Drought: Tolerant. Flood: Sensitive. Cold Injury: Infrequent. Wind Storm Damage: Infrequent. Disease Issues: Minor. Insect/Pest Damage: Minor. Animal Damage: Deer. Bloom Time: Summer - Late Fall. Fruit Time: Summer - Fall [318-1]. Tends to sprawl, particularly if grown in moist and/or fertile soils. Crown rot may occur if grown in moist, poorly drained soils. Plants may be sheared in mid to late summer to promote a fall rebloom and to remove any sprawling or unkempt foliage. Species plants can spread somewhat aggressively in the garden by both rhizomes and self-seeding [368-1]. 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 stoloniferous rooting from creeping stems above the ground [1-2].

4.2.46 Papaver orientale

Oriental Poppy

3 tlin 9 cyuc 1 kcak 0 tcan 1 dwat 1 m hkuc
htut cyutli hgatkycutcup hwicli hyishrasljut hpa7tli flatprik-
wis hpa7tmwatli fyifxre7t hjonli

drutta Papaver orientale is a PERENNIAL growing to 1 m (3ft 3in) by 0.8 m (2ft 7in) 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 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, 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 specific mention has been found for this plant, many species in this genus are toxic to mammals, though the toxicity, at least when grown in Britain, is low.

kcakta Edible Parts: Edible Uses: Condiment The young seed heads are used as a condiment, they are hot and acrid[2, 105, 183]. Some caution is advised, see the notes above on toxicity.

dwatta Diaphoretic The petals are sudorific[240].

nrakta W. Asia - Armenia, N.E. Iran, Turkey. ksacta Meadows, usually in sub-alpine zones, but also on stony slopes in the lower mountain zone[74].

propta Seed - sow June in an outdoor seedbed. Plant into permanent positions in September. Seed can also be sown in spring and may then flower in late summer. Division in March or October with care[200]. Another report suggests that division is very simple[190]. 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. Root cuttings 10cm long, November/December in a cold frame[111].

nwatta Landscape Uses: Alpine garden, Container, Foundation, Rock garden, Specimen, Woodland garden. Prefers a well-drained sandy loam in a sunny position[1, 200]. Succeeds in an ordinary good soil[111, 200] and in dry soils, tolerating drought when established[190]. Plants prefer a deep soil that is poor and dry rather than rich, they dislike moist conditions[233]. Plants can be grown in quite coarse

grass, which can be cut annually in the autumn[233]. A deep-rooting and almost indestructible plant, every scrap of the running root system that is left in the ground can grow into a new plant[190, 233]. There are many named varieties selected for their ornamental value[187, 200]. Members of this genus are rarely if ever troubled by browsing deer or rabbits[233]. A good bee plant[108]. Special Features: Attractive foliage, All or parts of this plant are poisonous, Attracts butterflies, Suitable for cut flowers.

4.2.47 Symphoricarpos occidentalis

Wolfberry, Western snowberry

3 tlin 7 cyuc 1 kcak 0 tcan 1 dwat 1.8 m hkuc
pcimhmimhtut cyutli kyucutcup hwicli hyishrasljutnyikfrilp
hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

drutta Symphoricarpos occidentalis is a deciduous Shrub growing to 1.8 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from June to July, and the seeds ripen from September to November. 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 and nutritionally poor 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 or moist soil. The plant can tolerate maritime exposure. It can tolerate atmospheric pollution.

pcista No report of toxicity has been seen for this species but the fruit of many if not all members of this genus contains saponins. Although toxic, these substances are very poorly absorbed by the body and so tend to pass through without causing harm. They are also destroyed 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 but it would take extremely large doses of many kilos of fruit from this plant in order to produce toxic symptoms[65]. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K].

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[161]. Inspid. They are best if cooked. A famine food, they are only used when all else fails[177, 257]. The fruit is about 8mm in diameter[200]. See the notes at top of page regarding possible toxicity.

tcanta Broom Hedge Hedge Soil stabilization Plants have extensive root systems and are used to stabilize soils on banks and slopes[200]. The branches can be made into brooms[257]. Very tolerant of trimming, it can be grown as a medium to tall hedge[200].

dwatta Birthing aid Ophthalmic An infusion of the leaves has been used as a wash for weak and inflamed eyes[257]. An infusion of the root has been used to cleanse the afterbirth and aid in convalescence[257].

nrakta Western N. America - Illinois, Michigan and Minnesota to British Columbia, Kansas and Colorado. ksacta Bluffs, dry prairies and plains[43], mainly in the Rockies[11].

propta Seed - best sown as soon as it is ripe in a cold frame. Stored seed requires 3 months warm then 5 months cold stratification[98]. 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, July/August in a frame[113]. Cuttings of mature wood of the current year's growth, 15 - 25cm long preferably with a heel, in a sheltered bed outdoors in winter. High percentage[78, 200]. Division of suckers in winter. They can be planted out direct into their permanent positions.

nwatta Tolerates most soils and conditions, including poor soils and amongst the roots and under the drip of trees[11, 200]. Grows well in heavy clay soils. Prefers a well-drained soil[200]. Does well in sun or shade[1]. Tolerates urban pollution and maritime exposure[200]. A very hardy plant, tolerating temperatures down to about -40°C[200]. Plants in this genus are notably resistant to honey fungus[200].

4.2.48 Liatris punctata

Snakeroot, Dotted blazing star, Mexican blazing star, Nebraska blazing star

3 tlin 7 cyuc 1 kcaak 0 tcan 2 dwat 0.6 m hkuc
hmmihmtut cyutli kyuctcup hwicli hyishrasjlut hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta *Liatris punctata* 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 August to September, 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) 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.

kcakta Edible Parts: RootEdible Uses: Root - raw or cooked[46, 61, 105, 161, 212, 257]. A sweet flavour when harvested in the spring and baked[257]. Eating the root is said to improve the appetite[257].

dwatta Antipruritic Diuretic Poulitce StomachicAn infusion of the roots has been used in the treatment of stomach aches, bloody urine and women's bladder complaints[257]. The root has been chewed and the juice swallowed in the treatment of swollen testes[257]. A decoction of the roots is used as a wash for itching skin complaints[238, 257]. A poultice of the boiled roots is applied to swellings[257].

nrakta Eastern N. America - Alberta to New Mexico and Texas, east to Minnesota and Nebraska.. ksacta Dry prairies and plains[43].

propta Seed - best sown as soon as it is ripe in autumn in a greenhouse[200]. Sow stored seed as soon as possible in the year in a greenhouse. Prick out the seedlings into individual pots when they are large enough to handle and grow the plants on in the greenhouse for their first year. Plant them out into their permanent positions in early summer. Division in spring[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. Basal cuttings taken in spring as growth commences. Harvest the shoots when they are about 10cm 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 Grows well in a moderately good light soil[200].Tolerates poor soils[200]. Plants are prone to rot overwinter in wet soils[200]. A good bee plant. Rodents are very fond of the tubers so the plants may require some protection[200].

4.2.49 Eriogonum corymbosum

Crispleaf Buckwheat, Las Vegas wild buckwheat

3 tlin 7 cyuc 1 kcaak 0 tcan 1 dwat 0.3 m hkuc
htut cyutli kyuctcup hwicli hyishrasjlut hpa7tli flatprik-lwis hpa7tmwatli xre7t hjonli

drutta *Eriogonum corymbosum* is an evergreen Shrub growing to 0.3 m (1ft) 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 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, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: LeavesEdible Uses: Leaves and stems - cooked[46, 61, 161]. The leaves can be boiled, mixed with water and cornmeal and baked into a bread[257]. The stems are boiled, pressed into cakes then dried and eaten with salt[270].

dwatta A decoction of the leaves, taken three times a day, is a remedy for headache[257]. The var glutinosum was most probably used[270]. This variety was also used as a treatment for TB, or at least to treat coughs[270].

nrakta Western N. America - Nebraska and Kansas to New Mexico, Utah and Arizona. ksacta Sandy to gravelly or clayey flats, washes, slopes, outcrops, and cliffs, saltbush,

blackbrush, and sagebrush communities, pinyon-juniper and montane conifer woodlands; 1200-2700 metres[270].

propta Seed - best sown as soon as it is ripe in the autumn in a sandy compost in a greenhouse. Sow stored seed in early spring in a warm greenhouse[1]. As soon as 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 out in late spring or early summer, after the last expected frosts. Division in early spring[1]. This has to be done with care because the plant resents root disturbance[200]. Try to obtain divisions from around the edges of the plants without digging up the whole clump. Tease the divisions out with as much root on them as possible and pot them up. Grow them on in light shade in the greenhouse until they are rooting well and plant them out in the summer. Cuttings of greenwood with a heel in the summer[200]. Cuttings of almost ripe shoots with a heel, July/August in a frame.

nwatta Requires a loose lean gritty well-drained soil in a very sunny position[200]. Succeeds in dry soils. Tolerates exposed positions[200]. Requires some protection from winter wet[1]. A very variable species, it has been divided into a number of distinct varieties[270]. Established plants resent root disturbance[200], though small plants can be moved successfully[270]. A slow growing plant[270]. A good bee plant[94].

4.2.50 Gaillardia x grandiflora

Blanket flower

3 tlin 10 cyuc 1 kcaak 3 tcan 0 dwat 0.3 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlut hpa7tli frusflat-prikwslip hpa7tmwatli hjonli

drutta *Gaillardia x grandiflora* is a PERENNIAL growing to 0.3 m (1ft) by 0.5 m (1ft 8in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. The flowers are pollinated by Butterflies birds. 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 cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista The juice, sap, or thorns of these plants may cause a skin rash or irritation.

kcakta Edible Parts: LeavesEdible Uses: Leaf [2-1]. The species *Gaillardia pinnatifida* dried seeds can be ground into a powder then kneaded into seed butter and spread on bread[257] but no information was found for *Gaillardia x grandiflora*.

tcanta Containers Cut flowersGround cover for compact cultivars. Compact cultivars include *G. x grandiflora* "Arizona Sun" with stunning mahogany-red rimmed golden yellows (0.3m 12inches). *G. x grandiflora* "Mesa Peach" and "Mesa Red" (0.4m, 18 inches). Landscape uses include beds, borders, patios and containers. Locations include rock gardens, cottage garden, meadow, prairie, coastal, cutting garden and food forest. Sometimes grown as an annual. Attractive to butterflies and native bees. Insectory - excellent source of nectar for butterflies. Seeds provide food for birds. Good For Cut Flowers, Good For Containers, Extended Bloom Time (more than 4 weeks).

dwatta The species *Gaillardia pinnatifida* is known as a diuretic, taken to give relief from painful urination[216, 257]. And an infusion of the leaves is taken internally, and a poultice applied externally, in the treatment of gout[257]. No information could be found on *Gaillardia x grandiflora*.

nrakta Garden origin. ksacta A hybrid.

propta Seed, basal cuttings, or division. Dividing them in spring or early fall every two to three years will improve vigor.

nwatta A short-lived perennial winter hardy to USDA Zones 3 [368-1]. It prefers full sun, sandy, Loamy or Silty soil, and moderate to dry soil moisture. Soil pH: 5.5 - 7.9. *Gaillardia x grandiflora* is drought tolerant but prefers a moist well-drained soil. Performs poorly in unamended heavy clay soils [368-1]. *Gaillardia x grandiflora* is a tetraploid hybrid resulting from a cross between a 3' tall perennial *gaillardia* (*G. aristata*) and a 2' tall annual *gaillardia* (*G. pulchella*). It arguably inherited its perennial habit from the former and its long flowering period and rapid growth rate from the latter [368-1]. Flower Color: Orange, Red, Rust, or Yellow. Blooms

fall spring to fall. Heat zones 1 -8. Plants are so prolific and long blooming that they often exhaust themselves and are then short-lived[200]. Members of this genus are rarely if ever troubled by browsing deer[233]. Several cultivars exist, among them 'Arizona sun' and 'Arizona red shades'. Minimum Root Depth: 16 inches. In garden design, as well as the above-ground architecture of a plant, root structure considerations 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].

4.2.51 *Artemisia stelleriana*

Beach Wormwood, Oldwoman, Dusty Miller
3 tin 9 cyuc 1 kcaak 3 tcan 0 dwat 0.5 m hkuc
htut cyutli hgatkuyctcup hwicli hyishrasjlut hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Artemisia stelleriana* is an evergreen Perennial growing to 0.5 m (1ft 8in) by 0.6 m (2ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf all year, 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 Insects. 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. The plant can tolerate maritime exposure.

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].

kcakta Edible Parts: Edible Uses: CondimentThe leaves are used for flavouring rice dumplings[177, 179, 183].

tcanta Plants can be grown as ground cover in a sunny position[197], they are of sprawling habit[208]. Provides shelter for beneficial invertebrates: insects and other arthropods. A specialist nectary plant [1-2]. Landscape Uses: Border, Ground cover, Massing, Seashore, Specimen. Some named forms have been selected for their ornamental value[187]. Special Features: Attractive foliage, North American native, Suitable for dried flowers.

nrakta E. Asia - Japan, Korea, Siberia. Naturalized in Britain[17]. ksacta Sand dunes and coastal cliffs, C. and N. Japan[58, 187]. Naturalized on sand near Marazion in Cornwall[1].

propta Seed - surface sow from late winter to early summer in a greenhouse, making sure that the compost does not dry out[200]. When large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant out in late spring or early summer. Division in spring or autumn[200]. 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 Requires a well-drained sandy soil and a sunny position[187]. Established plants are drought tolerant[190]. Grows well in maritime areas and in cold gardens[208, 233]. Plants are longer lived, more hardy and more aromatic when they are grown in a poor dry soil[245]. 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 clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2].

4.2.52 *Marrubium vulgare*

White Horehound, Horehound
3 tin 7 cyuc 1 kcaak 3 tcan 3 dwat 0.5 m hkuc
htut cyutli kyuctcup hwicli hyishrasjlutnyk hpa7tli flatprik-
wis hpa7tmwatli fyifre7t hjonli

drutta *Marrubium vulgare* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 3 and is not frost tender. It is in flower from June to November, 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, 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.

pcista Heart rhythm, blood pressure, and blood glucose levels affected by large doses. Avoid during pregnancy and breast feeding. Diabetes mellitus patients on allopathic medication to lower blood sugar should avoid [301].

kcakta Edible Parts: Edible Uses: Condiment TeaThe leaves are used as a seasoning[27]. Bitter and pungent, they are sometimes used to flavour herb beer or liqueurs[4, 183]. Horehound ale is a fairly well-known drink made from the leaves[4, 238]. A mild pleasantly flavoured tea is made from the fresh or dried leaves[183], it is a favourite cough remedy[4, 46].

tcanta Companion Essential RepellentAn essential oil is obtained from the plant and used as a flavouring in liqueurs[46]. The plant has been used as a cure for cankerworm in trees[238]. No more details are given but it is probably a strong infusion of the flowering shoots, or the essential oil, that is used[K]. The growing plant repels flies[201].

dwatta Antidiarrhoeal Antidote Antiflatulent Antiseptic Antispasmodic Appetizer Cholagogue Diaphoretic Digestive Diuretic Emmenagogue Expectorant Hepatic Stimulant TB TonicWhite horehound is a well-known and popular herbal medicine that is often used as a domestic remedy for coughs, colds, wheeziness etc[4, 254]. The herb apparently causes the secretion of a more fluid mucous, readily cleared by coughing[254]. The leaves and young flowering stems are antiseptic, antispasmodic, cholagogue, diaphoretic, digestive, diuretic, emmenagogue, strongly expectorant, hepatic, stimulant and tonic[4, 7, 9, 21, 165, 238]. Horehound is a very valuable pectoral, expectorant and tonic that can be safely used by children as well as adults[4]. It is often made into a syrup or candy in order to disguise its very bitter flavour, though it can also be taken as a tea[4]. As a bitter tonic, it increases the appetite and supports the function of the stomach[254]. It can also act to normalize heart rhythm[254]. The plant is harvested as it comes into flower and can be used fresh or dried[238]. The root is a remedy for the bite of rattlesnakes, it is used in equal portions with *Plantago lanceolata* or *P. major*[207]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Marrubium vulgare* for dyspepsia, loss of appetite (see [302] for critics of commission E).

nrakta Europe, including Britain, south and east to N. Africa, the Azores, central and western Asia. ksacta Downs, waste places and roadsides southwards from central Scotland, though perhaps only native near the south coast of England[17].

propta Seed - sow April/May or August/September in a cold frame. Germination can be slow and erratic[200]. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the following spring[K]. 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. Division in spring[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 White horehound is an easily grown plant that succeeds in most well-drained soils[200], though it flourishes best in a poor dry soil[1, 4]. Another report says that the plant flourishes best where there is plenty of nitrogen in the soil[274]. It prefers neutral to alkaline soil conditions[238] and requires a warm sunny position if it is to do well[14].

Often grown in the herb garden and sometimes cultivated commercially as a medicinal herb[4, 61]. If the plant is cut back after flowering it will normally produce a second crop of leaves[238]. The fresh leaves have a pronounced musky smell, though this is lost once the plant is dried[245]. A good bee plant[1]. White horehound is a good companion plant for growing near tomatoes[24]. The tomatoes crop for a longer period and also produce a heavier crop[201]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [2-1].

4.2.53 *Abies concolor*

Colorado Fir, White fir

3 tlin 7 cyuc 0 kcaak 0 tcan 2 dwat 45 m hkc
pcmhmmhtut cyutli kyuctcup hwcli hyishrasjlutnykfrp
hpa7tli flatprik hpa7tmwatli hjonli

drutta *Abies concolor* is an evergreen Tree growing to 45 m (147ft) by 8 m (26ft) 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 in April, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) 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. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers dry or moist soil.

tcanta Dye WoodA tan coloured dye can be obtained from the bark[257]. Wood - very light, not strong, coarse grained, soft, not durable. Used mainly for pulp, cases etc[46, 61, 82]. It is sometimes used in framing small houses but is not strong enough to be used in larger buildings[229]. The wood lacks a distinctive odour and so does not impart a flavour to items stored in it. Thus it can be used for making tubs for storing food items[229].

dwatta Antirheumatic Pectoral Poultice TBThe pitch from the trunk has been used as an antiseptic poultice for cuts, wounds etc[257]. An infusion of the pitch, or the bark, has been used in the treatment of TB[257] An infusion of the foliage has been used in a bath for relieving rheumatism[257]. An infusion of the pitch and leaves has been used in the treatment of pulmonary complaints[257].

nrakta South-western N. America - Oregon to California, to Arizona and New Mexico. ksacta Found on a wide range of soils, but preferring moist soils with a humid climate and a long winter from 700 metres to 3,400 metres[229].

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]. 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. 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].

nwatta Landscape Uses:Christmas tree, Firewood, Pest tolerant, Screen, Specimen. Prefers a good moist but not water-logged soil[1]. Grows well in heavy clay soils. Plants are very shade tolerant 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]. Prefers growing on a north-facing slope[200]. Trees succeed on poor dry sites in the wild[155]. Trees are shallow rooted and therefore liable to be wind-blown in exposed sites[155]. Trees grow almost as well in S. Britain as they do in cooler areas of the country[11]. They are at their best in the Perthshire valleys of Scotland and in N.E. England, trees in the south and east of the country tend to be thin in the crown and soon lose their shape. Trees in the west grow

better but also lose their shape after a while[11, 185]. New growth is from mid-May to July and trees are virtually never damaged by late frosts or aphids[1, 185]. Most trees of this species that are grown in Britain are in fact the sub-species *A. concolor lowiana*. (Gordon.) Lemmon. This form tends to grow better in Britain than the type. There are 2 basic forms of this sub-species, those from the north of the range are vigorous in height growth whilst the southern form is vigorous in girth growth[185]. They both have a potential for forestry use in Britain[185]. 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]. Plants are strongly outbreeding, self-fertilized seed usually grows poorly[200]. They hybridize freely with other members of this genus[200]. A very ornamental tree[1]. The crushed leaves have a strong lemony scent[185]. Special Features:Attractive foliage, North American native, Fragrant foliage, There are no flowers or blooms.

4.2.54 *Betula ermanii*

Gold Birch

3 tlin 7 cyuc 0 kcaak 3 tcan 1 dwat 25 m hkc
hmimhtut cyutli tcup hwcli hyishrasjlutnykfrp hpa7tli flat-
prikhwis hpa7tmwatli hjonli

drutta *Betula ermanii* is a deciduous Tree growing to 25 m (82ft) by 5 m (16ft) 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 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 can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

tcanta PioneerThe tree colonizes poor soils and cleared woodlands in the wild[11]. This makes it suitable for use as a pioneer species for re-establishing woodlands. It is a quite short-lived species, but grows fairly quickly and creates suitable conditions for more permanent trees to become established. Because its seedlings do not grow well in shady conditions, the birch is eventually out-competed by the other woodland trees.

dwatta Antiseborrheic VulneraryVulnerary. The bark is used to bandage wounds[61].

nrakta N.E. Asia - China, Japan. ksacta Mountains all over 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 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 very polymorphic species[58], it hybridizes freely with other members of this genus[50]. The young growth in spring is subject to damage by late frosts[1]. A colonizer of poor soils and cleared woodlands, it tolerates very poor soils[11]. Trees are notably susceptible to honey fungus[200].

4.2.55 *Centaurea montana*

Mountain Cornflower, Perennial cornflower, Mountain Bluet
3 tlin 9 cyuc 0 kcaak 0 tcan 2 dwat m hkc

Leafy spurge cyutli h gatkyuactup hwicli hyishrasjlutnyik hpa7tli flatprikwslip hpa7tmwatli fyifxre7t hjonli

drutta Centaurea montana is a PERENNIAL growing to 0.5 m (1ft 8in) 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 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, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in 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.

tcanta Can be used as a ground cover plant in a sunny position[188, 208].

dwatta Antitussive Astringent Diuretic Emmenagogue Ophthalmic Purgative TonicMountain cornflower is seldom used in modern herbalism, though it does still have a reputation in parts of Europe as a wash for tired eyes[268]. It is considered to be most effective on blue eyes, great plantain (Plantago majus) being used for brown eyes[268]. The dried flowers are antitussive, astringent, weakly diuretic, emmenagogue, ophthalmic, very mildly purgative and tonic[9]. An infusion can be used as a treatment for dropsy, constipation, as a mouthwash for bleeding gums and as an eye bath for conjunctivitis[9].

nrakta Europe. ksacta Mountain woodland margins and meadows[9].

propta Seed - sow March in a greenhouse. 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. The seed is best sown as soon as it is ripe in August in a greenhouse, overwintered under cover, and planted out in spring. Division in 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 summer or following spring. This should be done at least once every three years in order to maintain the plants vigour. Basal cuttings in spring. Harvest the shoots when they are about 5 - 10cm 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 Landscape Uses:Border, Container, Massing, Specimen. Succeeds in ordinary garden soil[1, 200]. Prefers a moist well-drained fertile soil and a sunny position[200]. Tolerates dry, low fertility and alkaline soils[200]. Plants are hardy to at least -20°C[187]. A very ornamental plant[1], there are some named varieties[187]. The plants have creeping rhizomes and form spreading patches[187]. A good bee plant[108]. Members of this genus are rarely if ever troubled by browsing deer[233]. Special Features: Attractive foliage, Invasive, Naturalizing, Suitable for cut flowers.

4.2.56 Euphorbia esula

Leafy Spurge. Green spurge

3 tlin 9 cyuc 0 kcaak 4 tcan 0 dwat 1 m hkuc
hmimhtut cyutli h gatkyuactup hwicli hyishrasjlutnyik hpa7tli flatprikwslip hpa7tmwatli hjonli

drutta Euphorbia esula is a PERENNIAL growing to 1 m (3ft 3in) by 0.4 m (1ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought.

pcista The sap contains a latex which is toxic on ingestion and highly irritant externally, causing photosensitive skin reactions and severe inflammation, especially on contact with eyes or open cuts. The toxicity can remain high even in dried plant material[200]. Prolonged and regular contact with the sap is inadvisable because of its carcinogenic nature[214].

tcanta Euphorbia esula has nutrient value similar to alfalfa (Medicago sativa L.) and crested wheatgrass (Agropyron cristatum (L.) Gaertn.) and provides nutritious forage for

sheep and goats. Potential as a whole plant biomass as a locally grown fuel crop for home-heating purposes (Maxwell et al., 1985). A high protein feed stock for grazing sheep and goats (Fox et al., 1991; Sedivec et al., 1995). The high protein diet result in very high quality mohair in angora goats (Stoneberg, 1989). High in hydrocarbon latex - possibly a good cool-hardy hydrocarbon species. Leafy spurge hay burns with 4x the energy of wheat straw [1-1]. Dynamic accumulator.

nrakta Eurasia. Native to central and southern Europe, and eastward through most of Asia north of the Himalaya to Korea and eastern Siberia. Currently found worldwide with the exception of Australia and New Zealand. ksacta Found on prairies, savannas, mountain meadows, and near woodlands. It grows in fields and waste places.

propta It can grow from seed or from creeping roots. Reproduces readily like by seeds that have a high germination rate and may remain viable in the soil for at least eight years.

nwatta Experimental Crop Management: HayClimate: boreal to subtropical. Humidity: arid to humid. Prefers areas of full sunlight and dry soil but can tolerate a variety of habitats including temperatures as low as -45C (-49F). A deep-rooted perennial plant. Roots grow twice as fast in sandy soil as in clay soil. Roots in clay soil have greater branching than those in sandy soil. High levels of soil nitrogen can reduce the biomass of leafy spurge roots and lead to greater root concentrations near the top of the soil profile (U.S. Forest Service). Especially aggressive in semi-arid situations. Adapted to a wide range of conditions, from moist to dry with annual rainfalls as low as 180mm (7"). It grows as clusters with upright stems, 0.3 to 1m tall. Cultivation: experimental. Management: hay (Describes the non-destructive management systems that are used in cultivation) [1-1].

4.2.57 Aster puniceus

Purplestem Aster

3 tlin 8 cyuc 0 kcaak 2 tcan 2 dwat 1.3 m hkuc
hmimhtut cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprikwslip hpa7tmwatli fyifxre7t hjonli

drutta Aster puniceus is a PERENNIAL growing to 1.3 m (4ft 3in) 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, 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.

tcanta Landscape uses: Forest garden, Cottage gardens, Water garden, Wildlife garden, Moist Prairie or Meadow, Perennial borders. Attracts wildlife: Butterfly nectar plant, Butterfly host plants.

dwatta The roots are diaphoretic, emmenagogue and febrifuge[257]. A decoction has been used in the treatment of colds, consumption, typhoid, pneumonia and fevers[257]. A decoction has been used to promote menstruation - this can lead to an abortion[257]. The decoction has also been used to restore a woman to health after giving birth[257]. The chewed root has been applied to an aching tooth to allay the pain[257].

nrakta Eastern N. America. Naturalized in several sites in northern Britain[17]. ksacta Not known

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], but it also succeeds in partial shade[233]. Prefers a rich soil[1], but tolerates poor ones[233]. Plants are hardy to about -25°C[187]. The crushed plant has a smell like juniper berries[257]. Hybridizes freely with other members of this genus[200]. Plants need to be divided every few years, preferably in the spring, in order to keep the plant vigorous[187]. Most species in this genus seem to be immune to the predations of rabbits[233]. Attracts butterflies and moths, it is also a good bee plant providing nectar in autumn[30].

4.2.58 *Artemisia vestita*

Russian Wormwood

3 tlin 7 cyuc 0 kcaak 0 tcan 1 dwat 1.2 m hkuc
htut cyutli hgakuyctcup hwicli hyishrasjlutnyik hpa7tli flatprikwli hpa7tmwatli xre7t hjonli

drutta *Artemisia vestita* 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 August to October, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, 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].

dwatta Antiphlogistic FebrifugeThe plant is antiphlogistic and febrifuge[266].

nrakta E. Asia from Pakistan to China and Tibet. ksacta Hills, rocky slopes, grasslands, shrublands and outer forest margins at elevations of 2000 - 4300 metres[266].

propta Seed - surface sow from late winter to early summer in a greenhouse, making sure that the compost does not dry out[200]. When large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter. Plant out in late spring or early summer. Division in spring or autumn[200]. 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 Easily grown in a well-drained circumneutral or slightly alkaline loamy soil, preferring a warm sunny dry position[1, 200]. Established plants are drought tolerant[200]. Plants are longer lived, more hardy and more aromatic when they are grown in a poor dry soil[245]. This species is closely related to *A. sacrorum* and *A. gmelinii*, it is often confused with those species[266]. We are not sure if this plant is annual, biennial or perennial, since various reports differ. Members of this genus are rarely if ever troubled by browsing deer[233].

4.2.59 *Dicentra eximia*

Dwarf bleeding heart, turkey-corn

3 tlin 9 cyuc 0 kcaak 4 tcan 0 dwat 0.4 m hkuc
pcimhmim cyutli tcup hwicli hyishrasjlutnyik hpa7tli flatprik hpa7tmwatli hjonli

drutta *Dicentra eximia* is a PERENNIAL growing to 0.4 m (1ft 4in) by 0.4 m (1ft 4in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. The flowers are pollinated by Birds, Bees, Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor 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.

pcista Fatal in large quantities. Symptoms include: trembling, staggering, vomiting, diarrhea, convulsions and labored breathing. Skin irritation after repeated contact with the cell sap is mild and short-lasting.

tcanta Groundcover: A medium density moderately good groundcover for shade and semi-shade. Colonizes

very slowly through rhizomes. Wildlife Food: The nectar is sought by hummingbirds. Wildlife Habitat: Provides cover for small wildlife. Insectory: Attracts beneficial insects [318-1]. Good companion plants include; Jacobs Ladder and Wild Columbine. Cut Flowers. Ornamental: Ornamental foliage and flowers. The foliage is deeply cut and fern-like, and does not die back like the common bleeding heart. Flowers are shades of pink and white and heart shaped [318-1].

nrakta Native to the Eastern North America - Appalachian Mountains. ksacta Forest and mountain areas from New York to Georgia and Tennessee growing on forest floors, rocky woods and ledges on rocky soils in the Appalachian Mountains. Shade-loving.

propta

nwatta An herbaceous perennial growing well in semi-shade. USDA Hardiness Zones: 3 - 9. Soil pH: 5.5 - 7.0. Life Span: Long-Lived Perennial. Stand Persistence: Long. Form: Upright. Texture: Fine. Sun: Partial Shade, Shade. Soil Type: Loamy, Silty. Soil Moisture: Moderate. Minimum Root Depth: 6 inches (15cm). Root Type: Rhizome, Fibrous Shallow. Fungal Types: Endomycorrhizal. Seasonal Interest: Summer. Will tolerate full sun if given sufficient moisture. Requires rich well-drained soil. Flowering may stop in areas with very hot weather. Will not go dormant in midsummer like the Common Bleeding Heart as long as the soil is kept moist. Tolerant of proximity to black walnut trees. Fruit Type: Capsule. Flower Color: Pink, Red, White. Drought: Sensitive. Flood: Intolerant. Salt: Intolerant. Soil Compaction: Sensitive. Mowing: Intolerant. Cold Injury: Infrequent. Disease Issues: Minor. Insect/Pest Damage: Minor. Animal Damage: Deer, Rabbits. Growing Season: Cool. Bloom Time: Late Spring - Early Fall. Fruit Time: Fall - Winter [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]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

4.2.60 *Echinops latifolius*

3 tlin 7 cyuc 0 kcaak 0 tcan 1 dwat 0.5 m hkuc

htut cyutli hgakuyctcup hwicli hyishrasjlutnyik hpa7tli flatprikwli hpa7tmwatli xre7t hjonli

drutta *Echinops latifolius* is a PERENNIAL growing to 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 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 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.

dwatta Antiinflammatory GalactagogueThe root is anti-inflammatory and galactagogue[176]. It is used in the treatment of breast abscesses with inflammation, mastitis, lack of milk in nursing mothers and distension of the breast[176].

nrakta E. Asia - China, Siberia, Mongolia. ksacta Grassland and open forests at elevations of 100 - 2200 metres[266].

propta Seed - sow early spring in a cold frame[111]. The seed usually germinates in 3 - 9 weeks at 25°C[175]. 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 an outdoor seedbed in mid spring and is then planted out into its permanent position in late summer or the autumn[111]. Division in autumn[111]. Root cuttings in the winter[200].

nwatta Succeeds in a sunny position in any well drained soil of low or medium fertility[200]. Established plants are drought tolerant[190]. The flowers are often used for dried flower displays[200]. If all the flowers are removed early in the season, the plant will often produce a second flush of bloom later in the summer[200].

4.2.61 Agrostis capillaris

Browntop Bent Grass

3 tlin 10 cyuc 0 kcak 4 tcan 0 dwat 0.4 m hkuc
hmmihtuk cyutli tcuphja7n hwicli hyishrasjlut hpa7tli frusflatprikwlwshom hpa7tmwatli hjonli

drutta *Agrostis capillaris* is an evergreen Perennial growing to 0.4 m (1ft 4in) by 0.1 m (0ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. The flowers are pollinated by Wind. It is noted for attracting wildlife. 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 and can grow in very acid and saline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil. It can tolerate atmospheric pollution.

tcanta FodderForest garden path mix [1-9]. Environmental Uses: Amenity, Erosion control or dune stabilization, Landscape improvement, Revegetation, Soil conservation. Ornamental: garden plant, Seed trade [1-8]. Agronomically valuable fodder and pasture grass for livestock production, occasionally cut for hay. Used in garden lawn mixtures and in particular for tennis courts and golf course fairways. Widely grown in mild (cool-humid) summers, including some parts of Australia, northern Europe, the USA and New Zealand. Compared to *A. stolonifera*, *A. capillaris* has a more upright growth habit and does not spread aggressively. Used outside its native range for erosion control and in rehabilitation work. A food source for herbivores, including rabbits [1-8].

nrakta Native to Eurasia, from Ireland and Britain in the west, through Siberia and Central Asia, as far east as China and from Scandinavia south to the Mediterranean, including Tunisia in North Africa. Introduced and naturalized in the Americas (USA, Canada, Greenland, Brazil, Argentina and Chile), southern Africa, Australia and New Zealand [1-8]. ksacta Grasslands and pastures. Dominant on poor and acidic soils and is well adapted to grazing pressure. Invades ruderal, disturbed areas, heathland, woodland, scrub and sand dune habitats. Abundant in wetlands and cultivated areas. In Australia, it is reported from dry coastal vegetation, heathy woodlands, lowland grasslands, grassy woodlands, dry and damp sclerophyll forests, riparian vegetation and alpine and sub-alpine vegetation, including montane peatlands and swamps [1-8].

propta Seed

nwatta A rhizomatous and stoloniferous attractive, relatively short perennial grass. Ranging from 10 to 70 cm high. Soil drainage: free or impeded. Soil reaction: acid, alkaline, neutral. Dominant on poor and acidic soils. Soil texture: light or medium [1-8]. Found on a wide range of soils both damp and dry and from neutral to acidic. A hardy grass forming short grazed turf on poor soils on hills and mountains. Common and widespread in both lowland and upland pasture, meadows, heaths, open woodlands, road verges and banks. Upper elevation limit = 945m. Lower elevation limit = 0m.

4.2.62 Echinops ritro

Globe Thistle, Southern globethistle, Small Globe Thistle

3 tlin 10 cyuc 0 kcak 0 tcan 1 dwat 0.5 m hkuc
htut cyutli hgatkyuctup hwicli hyishrasjlutnyik hpa7tli flatprikwlwsh hpa7tmwatli xre7t hjonli

drutta *Echinops ritro* is a PERENNIAL growing to 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. 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 cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

dwatta Antiinflammatory GalactogogueThe root is anti-inflammatory and galactogogue[176]. It is used in the treatment of breast abscesses with inflammation, mastitis, lack of milk in nursing mothers and distension of the breast[176].

nrakta Central and Eastern Europe to Central Asia. ksacta Gravely places on mountain slopes at elevations of 200 - 2400 metres in Tibet[266].

propta Seed - sow early spring in a cold frame[111]. The seed usually germinates in 3 - 9 weeks at 25°C[175]. 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 an outdoor seedbed in mid spring and is then planted out into its permanent position in late summer or the autumn[111]. Division in autumn[111]. Root cuttings in the winter[200].

nwatta Landscape Uses:Border, Container, Erosion control, Ground cover, Massing, Seashore, Specimen. Succeeds in a sunny position in any well drained soil of low or medium fertility[200]. Established plants are drought tolerant[190]. There are a number of named varieties, selected for their ornamental value[200]. The flowers are often used for dried flower displays[200]. If all the flowers are removed early in the season, the plant will often produce a second flush of bloom later in the summer[200]. Special Features: Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers. Extended bloom season in Zones 9A and above, Attractive flowers or blooms.

4.2.63 Erica tetralix

Bog Heather, Crossleaf heath

3 tlin 7 cyuc 0 kcak 3 tcan 0 dwat 0.3 m hkuc
htut cyutli tcuphja7n hwicli hyishrasjlut hpa7tli frusflatprik hpa7tmwatli fyfxfre7t hjonli

drutta *Erica tetralix* 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. It is in leaf all year, in flower from June to October, 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) 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 cannot grow in the shade. It prefers moist or wet soil. The plant can tolerate strong winds but not maritime exposure.

tcanta Broom DyeStems are used for making brooms, brushes etc[109]. A yellow dye is obtained from the plant[46, 61]. Plants can be grown as a ground cover[208]. They should be clipped in the spring in order to encourage denser growth[208].

nrakta Western Europe, including Britain, from Scandinavia to Spain east to N. Germany and Poland. ksacta Bogs, wet heaths and moors, rarely on drier soils[17].

propta Seed - surface sow in a sandy compost in a cold frame in spring. Keep moist. Prick out the plants as soon as they are large enough to handle and plant them in their permanent positions when they are 5 - 8cm tall[11]. Cuttings of half-ripe wood, 3cm long taken from twiggly lateral growths near the base of the plant, July/August in a frame. Remove the leaves from the bottom part of the stem without causing any damage to the bark. The cuttings root in a few weeks if they are given some bottom heat. Plant out in spring[11]. Layering in spring or autumn. Plants can be 'dropped' and then dug up and divided about 6 - 12 months later. Dropping involves digging up the plant and then replanting it about 15 - 20cm deeper in the soil to encourage roots to form along the stems[78].

nwatta Requires a light lime-free loam[1]. A calcifuge plant, requiring a pH below 6[186]. Grows best in a poor soil[11]. Resents dry soils[1], doing well in boggy areas[186]. Prefers an open situation[1]. A good bee plant[108]. There are many named forms, selected for their ornamental value[188]. 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 branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.2.64 Liatris scariosa

Devil's Bite

3 tlin 7 cyuc 0 kcak 0 tcan 2 dwat 0.8 m hkuc

hmmimhtut cyutli kyuctcup hwicli hyishrasjlut hpa7tli flatprik-
 wis hpa7tmwatli xre7t hjonli
 drutta *Liatris scariosa* 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 August to September, 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) 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.
 dwatta Appetizer Diuretic Poultice TonicThe root is ap-
 petizer, diuretic and tonic[4, 61, 238, 257]. It is used in the
 treatment of abdominal complaints, kidney and bladder prob-
 lems[257]. A poultice made from the powdered roots is ap-
 plied to snake bites[238] and external inflammations[257].
 nrakta South-eastern N. America. ksacta Dry stony soils
 on prairies and open forest glades[200].
 propta Seed - best sown as soon as it is ripe in autumn

in a greenhouse[200]. Sow stored seed as soon as possible in
 the year in a greenhouse. Prick out the seedlings into individ-
 ual pots when they are large enough to handle and grow the
 plants on in the greenhouse for their first year. Plant them
 out into their permanent positions in early summer. Divi-
 sion in spring[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 root-
 ing well. Plant them out in the spring. Basal cuttings taken in
 spring as growth commences. Harvest the shoots when they
 are about 10cm 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 Grows well in a moderately good light
 soil[200].Tolerates poor soils[200]. Plants are prone to rot
 overwinter in wet soils[200]. There are several named vari-
 eties, selected for their ornamental value[200]. A good bee
 plant. Rodents are very fond of the tubers so the plants may
 require some protection[200].

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