

Plants For a Future 2021CE

Hardiness Zone 6, Wet, Heavy Clay

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1 Introduction

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

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

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

You need about a hectare of land (2.5 acres) per person if you have 6 months growing season (where average temperature is above 10C), at least half of which should be dedicated to food, the other half can be to lumber, but can also be food trees that are occasionally used as lumber. A general formula is 6/monthsGrowingSeason to see how many hectares you need. This assumes you have at least 600mm of rainfall per year, and only works if you have more than 3 months growing season, as very little you can grow in less than that.

If you live in a dry area, especially one prone to flash floods, then it is imperative that you spend your dry season digging swales and vernal pools, that will collect the rain water during the flash floods and keep it in place so that it enters the ground, then you can grow things downhill of your vernal

pools and swales. It is generally more important that they be extensive than deep. You want to ideally catch every drop, so that none of it leaves your property.

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

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

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

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

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

1.1 Pronunciation guide

a /a/, b /b/, c /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 /q/ "ng", r /r/, s /s/, t /t/, u /u/, v /v/, w /w/, x /x/ /x/ "gh", y /j/, z /z/, 2 /l/ (low tone), 6 /ə/ "uh", 7 /r/ (high tone).

1.2 vocabulary

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

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

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

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

frus /frus/ corrosive (very acid), flat /flat/ acid, prik /prik/ passive (neutral), lwis /lwis/ alkaline, slip /slip/ slippery (very alkaline), hsom /hsom/ salt (saline), hpa7mwat /hpa.tmwat/ topsoil taste.

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

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

6 hmucrotkcec, tcup hmuchwic, 4 ksankcak, frip hmuchpa7t, lwis hmuchpa7mwat, 96 xlutkfam.

2 3 tlin

2.0.1 Malus domestica

Apple
3 tlin 8 cyuc 5 kcaak 4 tcan 2 dwat 9 m hkuc
hmimhtut cyutli tcup hwicli hrasj|lutnyikfrip hpa7tli flatprikliw
is hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

propta Seed - this species is a hybrid and will not breed true from seed, though some interesting new fruiting cultivars can be produced.. It is best sown as soon as it is ripe in the autumn in a cold frame. It usually germinates in late

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

nwatta An easily grown plant, it succeeds in most fertile soils, preferring a moisture retentive well-drained loamy soil[1, 200]. Grows well in heavy clay soils, though if these are poorly drained there could be problems with diseases such as canker[200]. Prefers a sunny position but succeeds in partial shade though it fruits less well in such a situation[1, 200]. Tolerates a pH range from 6 to 7, preferring a range of 6.5 to 6.8[200]. The apple is one of the most commonly cultivated fruit crops in the temperate zone. The primary climatic requirements for the production of good quality fruit are warm summer temperatures, relative freedom from spring frosts, reasonable protection from the wind (especially cold north and east winds) and an evenly distributed rainfall of about 600 - 800mm per annum[200]. Good apple production has been achieved as far north as 65°, whilst about 1000 hours of winter temperatures below 7°C are necessary to initiate flower production[269]. However good quality apples can still be produced in other areas with careful management and choice of cultivars[200]. Even in tropical latitudes, the plant has succeeded at high elevations, producing fruit at elevations over 3000 metres in Ecuador for example[269]. Where space is at a premium, or at the limits of their climatic range, apples can be grown against a wall. Most cultivars will grow well against a sunny south or west facing wall, an east facing wall will suit many of the tougher cultivars and even a north facing wall can be used for early culinary cultivars[219]. A hybrid of mixed origins, including *M. dasycphylla*, *M. praecox*, *M. pumila*, *M. sieversii* and *M. sylvestris*, this species is very commonly cultivated in temperate areas for its edible fruit[11]. There are very many named varieties[46, 183, 200] and with careful choice of these varieties it is possible to provide freshly harvested fruit from July to December and stored fruit for the rest of the year. When chives (*Allium schoenoprasum*) or other alliums are grown under apple trees it can prevent or cure scab[18]. A spray of the infused leaves of *Equisetum* spp can also be used against scab[18, 201]. If climbing nasturtiums (*Tropaeolum majus*) are grown into the tree they can repel woolly aphis[18, 201]. Apples lose their flavour if they are stored with potatoes[18]. They will also impart a bitter flavour to carrots or potatoes if they are stored in the same area[201]. Growing apples near potatoes makes the potatoes more susceptible to blight[201]. Wrapping maple leaves (*Acer* spp) around apples in store helps to preserve the apples[18, 20]. Apples store better if they are grown in a sward that contains a high percentage of clover[201]. Apple trees grow better and produce better quality fruit when foxgloves (*Digitalis* spp) and wallflowers (*Erysimum cheiri*) are growing in the orchard[201]. Dandelions (*Taraxacum* spp) produce ethylene gas and this can cause earlier ripening of fruit if plants are growing in an orchard[18]. The fruit is a good wildlife food source, especially for birds[200]. Hybridizes freely with other members of this genus[200]. Plants in this genus are notably susceptible to honey fungus[200].

2.0.2 Rosa rugosa

Ramanas Rose, *Rugosa* rose
3 tlin 9 cyuc 5 kcaak 3 tcan 2 dwat 2 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasj|lutnyikfrip hpa7tli flatprikliw hpa7tmwatli fyifxre7t hjonli

drutta *Rosa rugosa* is a deciduous Shrub growing to 2 m (6ft) by 2 m (6ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower from June to August, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly

alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate maritime exposure.

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

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

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

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

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

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

nwatta Prefers a light well-drained soil but succeeds in most soils including dry ones[11, 14, 200]. Grows well in heavy clay soils[200]. Prefers a circumneutral soil and a sunny position[200]. Dislikes water-logged soils[200]. Tolerates maritime exposure[14, K]. Plants are said to withstand temperatures down to -50°C without damage[160]. The foliage is said to resist disease[11]. A very ornamental plant[1], it suckers freely but these are fairly easily controlled[K]. There are a number of named varieties[11]. 'Scabrosa' is

said to be larger in all its parts, including the fruit[200], though it has not proved to be much larger with us[K]. The flowers have a clove-like perfume[245]. Grows well with alliums, parsley, mignonette and lupins[18, 20]. Dislikes boxwood[18]. Garlic planted nearby can help protect the plant from disease and insect predation[18, 20]. Hybridizes freely with other members of this genus[80]. Plants in this genus are notably susceptible to honey fungus[200]. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a running thicket former forming a colony from shoots away from the crown spreading indefinitely [1-2]. The root pattern is suckering with new plants from underground runners away from the plant [1-2].

2.0.3 Hemerocallis fulva

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

3 tin 10 cyuc 5 kcak 2 tcant 2 dwat 1 m hkuc
hmimhtw cyutli kyuctup hwicli hrasjlutnyikfrip hpa7tli flat-
prikhwit hpa7tmwalti dyatre7t hjonli

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

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

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

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

dwatta Anodyne Anthelmintic Antidote Antiemetic Antispasmodic Blood purifier Cancer Depurative Diuretic Febrifuge Laxative Sedative Diuretic, febrifuge, laxative (mild)[62, 178, 205]. The flowers are anodyne, antiemetic, antispasmodic, depurative, febrifuge and sedative[218]. In China they are used as an anodyne for women in childbirth[240]. An extract of the flowers is used as a blood purifier[240]. The rhizome has shown antimicrobial activity, it is

auto tuberculostatic and has an action against the parasitic worms that cause filariasis[279]. It is used in Korea to treat opilation, jaundice, constipation and pneumonia[279]. The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. The root also has a folk history of use in the treatment of cancer - extracts from the roots have shown antitumour activity[218]. A tea made from the boiled roots is used as a diuretic[205, 218].

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

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

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

2.0.4 Camassia quamash

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

3 tlin 7 cyuc 5 kcaak 3 tcan 1 dwat 0.3 m hkuc
hmmihmtut cyutli tcup hwicli hrasj|lutnyikfrip hpa7tli flatprikli-
wis hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

nwatta Succeeds in almost any soil[42]. Grows well in heavy clay soils. Prefers a rather heavy loam[1] that has plenty of moisture in spring but does not remain wet over the winter[138, 200]. Dislikes dry soils[200]. Prefers full sun but tolerates partial shade[138, 200]. The dormant bulbs are very hardy and will withstand soil temperatures down to at least -10°C[214]. Quamash is a very pretty flowering bulb that has quite a large potential as an edible ornamental plant[K]. It grows very well in the flower border but can also be naturalised in damp grass[134]. We are intending to grow it in a grassed-down orchard in our Cornish trial ground. The bulbs flower in late spring and early summer and have completely died down by early July so they do not interfere with harvesting the apple crop. The grass in the orchard will be cut in early spring before the quamash comes into growth, but will not be cut again until July. The bulbs will be harvested at any time from July to December and, since it is impossible to find all the bulbs, it is hoped that those remaining will be able to increase and supply bulbs for future years[K]. A polymorphic and very ornamental plant[1],

There are some named varieties [200]. The subspecies *C. quama* has larger bulbs than the type, up to 65mm in diameter [270]. A good bee plant [108]. This species can be confused with certain poisonous bulbs in the genus *Zigadenus* [85]. Plant the bulbs 7 - 10cm deep in early autumn and then leave undisturbed [1]. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is a bulb.

2.0.5 *Pyrus ussuriensis*

Harbin Pear, Chinese pear, Ussurian Pear
3 tlin 7 cyuc 4 kcaek 2 tcan 0 dwat 15 m hkuc
hmmihtut cyutli hgattcup hwicli hrasljutnyikfrip hpa7tli flat-prikliwis hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

2.0.6 *Malus prunifolia*

Chinese Apple, Plumleaf crab apple
3 tlin 7 cyuc 4 kcaek 0 tcan 0 dwat 8 m hkuc
hmmihtut cyutli hgattcup hwicli hrasljutnyikfrip hpa7tli flat-prikliwis hpa7tmwatli xre7t hjonli

drutta *Malus prunifolia* is a deciduous Tree growing to 8 m (26ft) by 8 m (26ft). See above for USDA hardiness.

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

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

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

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

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

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

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

2.0.7 *Malus pumila*

Paradise Apple, Common Apple, Apple Tree
3 tlin 9 cyuc 4 kcaek 3 tcan 2 dwat 7 m hkuc
hmmihtut cyutli tcup hwicli hrasljutnyikfrip hpa7tli flat-prikliwis hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

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

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

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

2.0.8 Sambucus nigra spp canadensis

American Elder

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

drutta Sambucus nigra spp canadensis is a deciduous Shrub growing to 4 m (13ft) by 4 m (13ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in July, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no

shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

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

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

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

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

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

propta Seed - best sown as soon as it is ripe in the autumn in a cold frame, when it should germinate in early spring. Stored seed can be sown in the spring in a cold frame but will probably germinate better if it is given 2 months warm followed by 2 months cold stratification first[78, 98, 113]. Prick out the seedlings into individual pots when they are large enough to handle. If good growth is made, the young plants can be placed in their permanent positions during the early summer. Otherwise, either put them in a shel-

Anter nursery bed, or keep them in their pots in a sheltered position and plant them out in spring of the following year. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame[78]. Cuttings of mature wood of the current season's growth, 15 - 20cm with a heel, late autumn in a frame or a sheltered outdoor bed[78]. Division of suckers in the dormant season.

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

2.0.9 Rheum x cultorum

Rhubarb
3 tlin 7 cyuc 4 kcak 2 tcan 3 dwat 1.5 m hkuc
hmmihtmt cyutli tcup hwicli jltynyikfrip hpa7tli flatprikwis
hpa7tmwatli xre7t hjonli

drutta Rheum x cultorum is a PERENNIAL growing to 1.5 m (5ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in leaf from February to October, in flower in June, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Wind. Suitable for: medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

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

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

dwatta Anticholesterolemic Antispasmodic Antitumor Aperient Astringent Cholagogue Demulcent Diuretic Homeopathy Laxative Purgative Stomachic Tonic The roots of many members of this genus are used medicinally. Whilst *R. palmatum* is the main species used in China, we have a report that this species (which has probably been derived from it through cultivation) is used in Korea[279]. The uses of *R. palmatum* are as follows:- Chinese rhubarb, called Da Huang in China, has a long and proven history of herbal usage, its main effect being a positive and balancing effect upon the whole digestive system. It is one of the most widely used herbs in Chinese medicine[238]. It has a safe and gentle action, safe even for children to use[254]. The plant is also part of a North American formula called *essiac* which is a popular treatment for cancer. Its effectiveness has never been reliably proven or disproven since controlled studies have not been carried out. The other herbs included in the formula are *Arctium lappa*, *Ulmus rubra* and *Rumex acetosella*[254]. The root is anticholesterolemic, anti-septic, antispasmodic, antitumor, aperient, astringent, cholagogue, demulcent, diuretic, laxative, purgative, stomachic and tonic[4, 7, 9, 21, 91, 171, 176, 238]. The roots contain anthraquinones, which have a purgative effect, and also tannins and bitters, which have an opposite astringent effect[244]. When taken in small doses, it acts as an astringent tonic to the digestive system, whilst larger doses act as a mild laxative[232, 244]. The root is taken internally in the treatment of chronic constipation, diarrhoea, liver and gall bladder complaints, haemorrhoids, menstrual problems and skin eruptions due to an accumulation of toxins[238]. This remedy is not prescribed for pregnant or lactating women, nor for patients with intestinal obstruction[238]. Externally, the root is used in the treatment of burns[238]. The roots are harvested in October from plants that are at least six years old, they are then dried for later use[4]. A homeopathic remedy is prepared from the dried root[232]. This is used especially in the treatment of diarrhoea in teething children[232].

nrakta E. Asia - Siberia. ksacta Steppe, sparse woods and sandy soils[74].

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

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

the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is fibrous dividing into a large number of fine roots [1-2].

2.0.10 *Camassia leichtlinii*

Wild Hyacinth, Large camas, Suksdorf's large camas

3 tlin 9 cyuc 4 kcaak 0 tcan 0 dwat 1 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnykfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

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

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

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

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

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

runner spreading indefinitely by rhizomes or stolons [1-2]. Ephemeral emerging in spring and dying back by summer every year [1-2]. The root pattern is a bulb.

2.0.11 *Mentha spicata*

Spearmint

3 tlin 9 cyuc 4 kcaak 3 tcan 3 dwat 0.6 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnykfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

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

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

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

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

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

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

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

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

2.0.12 *Mentha x piperita vulgaris*

Black Peppermint

3 tlin 7 cyuc 4 kcaak 3 tcan 5 dwat 0.5 m hkuc
hmimhtut cyutli tcup hwicli hras|lutnykfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

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

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

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

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

dwatta Abortifacient Anodyne Antiseptic Antispasmodic Aromatherapy Carminative Cholagogue Diaphoretic Refrigerant Stomachic Tonic Vasodilator Black peppermint is a very important and commonly used herbal remedy, being employed by allopathic doctors as well as herbalists[9]. It is

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

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

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

nwatta Succeeds in most soils and situations so long as the soil is not too dry[1, 200]. Grows well in heavy clay soils. A sunny position is best for the production of essential oils, but plants also succeed in partial shade. Prefers a slightly acid soil[16]. A commonly grown herb[4], it is often cultivated commercially for its essential oil[61]. This is the black form of peppermint and it is said to produce a superior essential oil, making it the preferred choice as a food flavouring and for medicinal purposes. The oil is of better quality when the plant is grown on dry soils[115]. Most mints have fairly aggressive spreading roots and, unless you have the space to let them roam, they need to be restrained by some means such as planting them in containers that are buried in the soil[K]. Hybridizes freely with other members of this genus. The flowers are very attractive to bees and butterflies[24]. A good companion for growing near cabbages and tomatoes, helping to keep them free of insect pests[20]. Members of this genus are rarely if ever troubled by browsing deer[233].

2.0.13 *Brassica oleracea botrytis*

Cauliflower

3 tlin 10 cyuc 4 kcaak 3 tcan 0 dwat 0.8 m hkuc
hmimhtut cyutli tcup hwicli hras|lutnykfrip hpa7tli flatprik-
wis hpa7tmwatli fyifxre7t hjonli

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

kcakta Edible Parts: Flowers Leaves Edible Uses: Immature flowering head - raw or cooked[1, 16, 37, 46]. A mild cabbage-like flavour, they make an excellent cooked vegetable and are also very acceptable in salads[K]. By careful selection of cultivars, it is possible to produce flowering heads all year round[K]. Leaves - cooked[37]. A mild cabbage

flavour, they make a good cooked vegetable[K]. Do not over-harvest them, however, since this would adversely affect the production of the flowering head[K].

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

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

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

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

3 4 tlin

3.1 bwon

3.1.1 *Vicia faba major*

Broad Bean, Fava Bean
tfo2n 4 tlin 10 cyuc 4 kcak 3 tcan 1 dwat m hkuc
hmmihtut cyutli hgattcup hwicli hrsajlutnyikfrp hpa7tli flat-
priklwis hpa7tmwatli fyfxre7t hjonli

drutta *Vicia faba major* is a ANNUAL growing to 1 m (3ft 3in) at a fast rate. See above for USDA hardness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to August, and the seeds ripen from July to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista Although often used as an edible seed, there are reports that eating the seed of this plant can cause the disease 'Favism' in susceptible people[7, 76]. Inhaling the pollen can also cause the disease[7, 218]. Favism, which is a

severe haemolytic anaemia due to an inherited deficiency[218], only occurs in cases of excessive consumption of the raw seed (no more details are given[K]) and when the person is genetically inclined towards the disease[7, 213]. About 1% of Caucasians and 15% of Negroids are susceptible to the disease[218].

kcakta Edible Parts: Leaves SeedEdible Uses: Immature seed - raw or cooked. Broad bean seeds are very nutritious and are frequently used as items of food. The seeds can be eaten raw when they are small and tender, as they grow older they can be cooked as a vegetable[2, 7, 16, 132, 183]. They have a very pleasant floury taste[K]. There are some potential problems to the use of these seeds if they are consumed in large quantities[7] - see the notes above on toxicity. Mature seeds can be eaten cooked as a vegetable or added to soups etc[2, 7, 16, 183]. They are best soaked for 12 - 24 hours prior to cooking in order to soften them and reduce the cooking time[K]. They will also become more nutritious this way[K]. The flavour is mild and pleasant with a floury texture[K]. They can also be dried and ground into a flour for use in making bread etc with cereal flours[183]. The seed can also be fermented to make tempeh[183]. Made into a paste, they can be used as a sandwich filling[299]. The seed can be sprouted before being cooked[183]. Popped seeds can be salted and eaten as a snack or roasted like peanuts[183]. Young pods - cooked and eaten as a vegetable[183]. They quickly become fibrous as they grow larger[183], and also develop a hairy coating inside the pods that can become unpleasant as the pods get larger[K]. Young leaves - cooked. They are very nutritious and can be used like spinach[105, 183].

tcanta Fibre Soap makingAgroforestry Uses: The stems and leaves are sometimes used as a green manure[299]. Broad beans grow well with carrots, cauliflowers, beet, cucumber, cabbages, leeks, celeriac, corn and potatoes, but is inhibited by onions, garlic and shallots[18, 20]. Other Uses: A fibre is obtained from the stems. The burnt stems are rich in potassium and can be used in making soap. The dried stems can be burnt as a fuel[299].

dwatta DiureticThe seedpods are diuretic and lithon-
triptic[7].

nrakta Long cultivated for its seed, the original habitat is obscure. ksacta Not known in a truly wild situation.

propta Pre-soak the seed for 24 hours in warm water and then sow in situ in succession from late winter until early summer. Germination should take place in about 7 - 10 days. The earlier sowings should be of suitably hardy varieties such as the 'Longpods' whilst later sowings can be of the tastier varieties such as the 'Windsors'. By making fresh sowings every 3 weeks you will have a continuous supply of fresh young seeds from early summer until early autumn. If you want to grow the beans to maturity then the seed needs to be sown by the middle of spring. You may need to protect the seed from the ravages of mice. Another sowing can be made in middle to late autumn. This has to be timed according to the area where the plants are being grown. The idea is that the plants will make some growth in the autumn and be perhaps 15 - 20cm tall by the time the colder part of winter sets in. As long as the winter is not too severe, the plants should stand well and will grow away rapidly in the spring to produce an earlier crop. The plants will also be less likely to be attacked by blackfly. Make sure you choose a suitably hardy variety for this sowing.

nwatta Broad beans originated in warm temperate areas and can be cultivated from the cold temperate zone to the subtropics, and also at higher elevations from 1,300 - 3,800 metres in the tropics. It may flower well in the lowland tropics, but usually does not produce pods[299]

]. The ideal temperature range in the growing season is between 18 - 27°C, at higher temperatures the flowers are often aborted[200]

]. The plant requires an annual rainfall of 700 - 1,000mm, of which more than 60% should occur during the growing period[299]

]. Prefers a fairly heavy loam but succeeds in a sunny position in most soils that are well-drained[1, 200]

]. Grows well in heavy clay soils. Dislikes dry conditions according to some reports[87, 200]

], whilst another says that it is drought tolerant once established[132]

]. Prefers a pH in the range 5.5 to 7[200].
]. There are two main forms of this species - small seeded forms that are more commonly grown for feeding livestock and as a green manure, and larger seeded forms that are usually grown for human food. Of the larger seeded forms there are two main types:- 'Longpod' beans are the more hardy and can be sown in the autumn in cool temperate areas. 'Windsor' beans, which are considered to be finer flavoured, are less tolerant of the cold and so are best sown in spring[132]

]. Autumn sown varieties are more susceptible to 'chocolate spot' fungus, this problem can be alleviated by the addition of potash to the soil[87]

]. Black fly can be a major problem. Autumn sown crops are less likely to be affected. Pinching out the soft tips of the plants, one they are tall enough and are beginning to flower, can reduce the problem since the blackfly always start on the soft shoots and then spread to the older stems. This species has a symbiotic relationship with certain soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200]

]. When removing plant remains at the end of the growing season, it is best to only remove the aerial parts of the plant, leaving the roots in the ground to decay and release their nitrogen.

3.1.2 *Desmanthus illinoensis*

Prairie Mimosa, Illinois bundleflower
tfo2n 4 tlin 8 cyuc 4 kcaak 1 tcan 1 dwat 1.3 m hkuc
htut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikliw
hpa7tmwatli xre7t hjonli

drutta *Desmanthus illinoensis* is a PERENNIAL growing to 1.3 m (4ft 3in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers moist soil.

kcaakta Edible Parts: SeedEdible Uses: Seed - cooked. Rich in protein but without much flavour[183]. The seed-pods are about 25mm long and contain 3 - 5 small seeds[235]. They are freely borne in the plants native environment, but will have to be very freely produced in this country if it is to be a worthwhile crop[K].

tcanta Root bark of *D. illinoensis* has been found to contain N,N-DMT, NMT, N-hydroxy-N-methyltryptamine, 2-hydroxy-N-methyltryptamine, and gramine (toxic). The root bark is mixed with a native source of beta-Carbolines to produce a hallucinogenic drink called prairiehuasca, which is an analog of the shamanic brew ayahuasca.

dwatta Antipruritic OphthalmicA leaf tea has been used in the treatment of itchy skin[222, 257]. Five seeds have been placed in the eye at night and washed out in the morning to treat trachoma[257].

nrakta N. America - Ohio to N. Dakota, New Mexico to Mississippi. ksacta Prairies, river banks and fields[222, 235]. Ditches, stream bottoms, fields, roadsides and low areas, often on clay soils[274].

propta Seed - pre-soak for 12 hours in warm water and then sow in a cold frame in the spring. Prick out the seedlings into individual pots as soon as they are large enough to handle and plant them out into their permanent positions in early summer. If you have sufficient seed then it is probably worthwhile sowing some in situ in mid to late spring.

nwatta Agroforestry Services: Nitrogen Management: Standard Staple Crop: Protein Under DevelopmentRequires a moist but well-drained soil in full sun[200]. Plants are often found growing in clay soils in the wild[274]. Suitable for the wild garden or other naturalistic plantings[200]. In favourable situations this plant can self-sow to the point of nuisance[200]. This plant is being evaluated by the Land Institute of Salina, Kansas, as an edible legume for growing with perennial grains in a non-tillage permaculture system[183]. It is certainly worthy of more attention in this country, though the small seed size mitigates against its use[K]. This species has a symbiotic relationship with certain

soil bacteria, these bacteria form nodules on the roots and fix atmospheric nitrogen. Some of this nitrogen is utilized by the growing plant but some can also be used by other plants growing nearby[200].

3.2 mran

3.2.1 *Quercus ilex*

Holly Oak, Evergreen Oak
4 tlin 10 cyuc 5 kcaak 3 tcan 2 dwat 25 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikliw
wisslipshom hpa7tmwatli hjonli

drutta *Quercus ilex* is an evergreen Tree growing to 25 m (82ft) by 20 m (65ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 7. It is in leaf all year, in flower from May to June, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline and saline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

kcaakta Edible Parts: Oil SeedEdible Uses: Coffee OilSeed - raw or cooked[1, 2, 46, 61]. It can be sweet or bitter[K]. The seed is up to 3cm long[200], it can be dried, ground into a powder and used as a thickening in stews etc or mixed with cereals for making bread. The seed from some trees contains bitter tannins, these can be leached out by thoroughly washing the seed in running water though many minerals will also be lost. Either the whole seed can be used or the seed can be dried and ground it into a powder. It can take several days or even weeks to properly leach whole seeds, one method was to wrap them in a cloth bag and place them in a stream. Leaching the powder is quicker. A simple taste test can tell when the tannin has been leached. The traditional method of preparing the seed was to bury it in boggy ground overwinter. The germinating seed was dug up in the spring when it would have lost most of its astringency. The roasted seed is a coffee substitute. An edible oil is obtained from the seed[183]. One reader noted the *Q. suber* population of the Mamora forest in Morocco contains only sweet acorns and can be eaten raw, it has a similar taste to raw chestnuts. The skin removes quite easily *Quercus ilex* also exists with tannin-free acorns in the Moroccan forests, the locals say around 20 percent are sweet.

tcanta Fodder Fuel Hedge Hedge Oil Repellent Shelterbelt Tannin WoodLandscape Uses: Specimen, Street tree. A mulch of the leaves repels slugs, grubs etc, though fresh leaves should not be used as these can inhibit plant growth[20]. Oak galls are excrescences that are sometimes produced in great numbers on the tree and are caused by the activity of the larvae of different insects. The insects live inside these galls, obtaining their nutrient therein. When the insect pupates and leaves, the gall can be used as a rich source of tannin, that can also be used as a dyestuff[4]. Very tolerant of maritime exposure and of trimming, it can be grown as a shelterbelt tree or hedge in maritime areas[11, 29, 49, 75]. Wood - strong, hard, durable. Used for furniture[46, 61, 89]. It makes a good charcoal[89] and a good fuel, burning well even if green[146]. The bark is a source of tannin[146]. Heat Zone: 9-2.

dwatta Astringent DysenteryAny galls produced on the tree are strongly astringent and can be used in the treatment of haemorrhages, chronic diarrhoea, dysentery etc[4].

nrakta Europe - Mediterranean. Occasionally naturalized in Britain in S. England[17]. ksacta Arid places, maquis, woods and hills on limestone[89].

propta Seed - it quickly loses viability if it is allowed to dry out. It can be stored moist and cool overwinter but is best sown as soon as it is ripe in an outdoor seed bed, though it must be protected from mice, squirrels etc. Small quantities of seed can be sown in deep pots in a cold frame. Plants produce a deep taproot and need to be planted out into their permanent positions as soon as possible, in fact seed sown in situ will produce the best trees[11]. Trees should not be left in a nursery bed for more than 2 growing seasons without being moved or they will transplant very badly.

nwtta Fodder: Mast Industrial Crop: Tan-
 nin Management: Standard Other Systems: De-
 hesa Regional Crop Staple Crop: Balanced carbPrefers
 a good deep fertile loam which can be on the stiff side[11].
 Thrives on shallow chalky soils[188]. Succeeds in all soils
 except those that are cold and poorly drained[98]. Grows
 well in sandy soils[188]. Young plants tolerate reasonable
 levels of side shade[200]. Very resistant to maritime expo-
 sure[11, 49, 75]. A very ornamental tree[1] but it is quite
 slow-growing[75]. Transplants badly unless moved regularly
 and this should be done as growth commences in late May
 or in September[11]. Fruits very freely in Britain[K]. The
 seed ripens in its first year[200]. The sub-species *Q. ilex*
ballota is cultivated for its sweet-tasting edible seed in Por-
 tugal and Spain[K]. Hybridizes freely with other members of
 the genus[200]. This species is notably resistant to honey
 fungus[88, 200]. Special Features: Not North American
 native, inconspicuous flowers or blooms. The plant is heat
 tolerant in zones 9 through 2. (Plant Hardiness Zones show
 how well plants withstand cold winter temperatures. Plant
 Heat Zones show when plants would start suffering from
 the heat. The Plant Heat Zone map is based on the num-
 ber of "heat days" experienced in a given area where the
 temperature climbs to over 86 degrees F (30°C). At this tem-
 perature, many plants begin to suffer physiological damage.
 Heat Zones range from 1 (no heat days) to 12 (210 or more
 heat days). For example Heat Zone. 11-1 indicates that the
 plant is heat tolerant in zones 11 through 1.) For polyculture
 design as well as the above-ground architecture (form - tree,
 shrub etc. and size shown above) information on the habit
 and root pattern is also useful and given here if available.
 The plant growth habit is a standard with a non-suckering
 single trunk [1-2].

3.2.2 *Prunus domestica*

Plum, European plum
 4 tlin 9 cyuc 5 kcaak 3 tcan 2 dwat 12 m hkuc
 hmimhtut cyutli tcup hwicli hrasjlutnykfrip hpa7tli flatprikli-
 wis hpa7tmwatli fyifxre7t hjonli

drutta *Prunus domestica* is a deciduous Tree growing to
 12 m (39ft) by 10 m (32ft) at a medium rate. See above for
 USDA hardiness. It is hardy to UK zone 5. It is in flower
 in April, and the seeds ripen from July to November. The
 species is hermaphrodite (has both male and female organs)
 and is pollinated by Insects. The plant is self-fertile. Suit-
 able for: light (sandy), medium (loamy) and heavy (clay) soils,
 prefers well-drained soil and can grow in heavy clay soil.
 Suitable pH: mildly acid, neutral and basic (mildly alkaline)
 soils. It can grow in semi-shade (light woodland) or no shade.
 It prefers moist soil.

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

kcakta Edible Parts: Flowers Fruit Oil Oil SeedEdible
 Uses: Gum Oil Oil TeaFruit - raw or cooked[1, 2, 7, 46]. The
 fruit varies considerably from cultivar to cultivar, but it is
 generally somewhat mealy, soft and juicy with a delicious
 flavour ranging from very sweet to acid[K]. The more acid
 fruits are usually only used for cooking purposes[K]. The fruit
 varies widely in size according to cultivar but can be 8cm long
 and contains a single large seed[200]. Seed - raw or cooked.
 Do not eat the seed if it is too bitter - see the notes above on
 toxicity. An edible gum is obtained from points of damage
 on the trunk[64]. The seed contains about 20% of an edible
 semi-drying oil[4, 57]. It has an agreeable almond smell and
 flavour[4]. The flowers are eaten. They are used as a garnish
 for salads and ice cream or brewed into a tea[183].

tcanta Adhesive Dye Gum Oil Oil WoodA green dye can
 be obtained from the leaves[168]. A dark grey to green dye
 can be obtained from the fruit[168]. A yellow dye is obtained
 from the bark[115]. A gum obtained from points of damage

along the stem can be used as an adhesive[64]. The ground
 up seeds are used cosmetically in the production of face-
 masks for dry skin[7]. A semi-drying oil is obtained from the
 seed[64]. No details of its uses. Wood - hard, compact. Used
 for musical instruments[115].

dwatta Febrifuge Laxative StomachicThe dried fruit,
 known as prunes, is a safe and effective laxative and is also
 stomachic[4, 7, 21, 238]. The bark is sometimes used as a
 febrifuge[7]. Although no specific mention has been seen for
 this species, all members of the genus contain amygdalin and
 prunasin, substances which break down in water to form hy-
 drocyanic acid (cyanide or prussic acid). In small amounts
 this exceedingly poisonous compound stimulates respiration,
 improves digestion and gives a sense of well-being[238].

nrakta Europe to W. Asia. Naturalized in Britain. A hy-
 brid *P. spinosa* x *P. cerasifera* divaricata. ksacta Found in
 hedges in Britain[17].

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

nwtta Requires a well-drained moisture retentive
 soil[1, 11] and a sheltered position[200]. Succeeds in light
 shade but fruits better in a sunny position[11, 200]. Thrives
 in a loamy soil, doing well on limestone[11]. Grows well
 in heavy clay soils. Prefers some chalk in the soil but it is
 apt to become chlorotic if too much is present[1]. Prefers a
 pH between 6 and 6.5[200]. The plum is widely culti-
 vated for its edible fruit in temperate zones, there are many
 named varieties able to supply fresh fruits from late July to
 November or December[183]. Many cultivars are fully self-
 fertile, though some are partially self-sterile and others re-
 quire cross-pollination[200]. Where space is at a premium,
 or at the limits of their climatic range, plums can be grown
 against a wall. Most cultivars will grow well against a sunny
 south or west facing wall, whilst an east facing wall will suit
 some of the tougher cultivars, a north facing wall is not re-
 ally suitable[219]. This species is probably a hybrid of an-
 cient origin between *P. spinosa* and *P. cerasifera*, coupled
 with chromosome doubling[17]. It does not cross-pollinate
 with the Japanese plum, *P. salicina*[200]. Prefers growing in
 a continental climate, mild winters tend to encourage ear-
 lier flowering with a greater risk of frost damage to the blos-
 som. In Britain the best fruits are produced away from the
 western side of the country. Most members of this genus
 are shallow-rooted and will produce suckers if the roots are
 damaged[238]. Plants in this genus are notably susceptible
 to honey fungus[200]. The plant is heat tolerant in zones
 8 through 3. (Plant Hardiness Zones show how well plants
 withstand cold winter temperatures. Plant Heat Zones show
 when plants would start suffering from the heat. The Plant
 Heat Zone map is based on the number of "heat days" experi-
 enced in a given area where the temperature climbs to over
 86 degrees F (30°C). At this temperature, many plants begin
 to suffer physiological damage. Heat Zones range from 1 (no
 heat days) to 12 (210 or more heat days). For example Heat
 Zone. 11-1 indicates that the plant is heat tolerant in zones
 11 through 1.) For polyculture design as well as the above-
 ground architecture (form - tree, shrub etc. and size shown
 above) information on the habit and root pattern is also useful
 and given here if available. A sprouting standard sending up
 shoots from the base [1-2]. In garden design, as well as the
 above-ground architecture of a plant, root structure consid-
 erations help in choosing plants that work together for their
 optimal soil requirements including nutrients and water. The
 root pattern is flat with shallow roots spreading near the soil
 surface. The root pattern is suckering with new plants from
 runners away from the plant [2-1].

3.2.3 *Crataegus pedicellata*

Scarlet Haw, Scarlet hawthorn
 4 tlin 8 cyuc 5 kcaak 2 tcan 2 dwat 7 m hkuc

hagttcuphja7n hwicli hrasjlytnyikfrip hpa7tli flatprikhwisslip hpa7tmwatli xre7t hjonli

drutta Crataegus pedicellata is a deciduous Shrub growing to 7 m (23ft) by 7 m (23ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to May, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[K]. A very variable species, especially in its fruit which ranges considerable in size and quality[K]. Up to 10mm long and pear shaped, the flesh is sweet but dry and mealy[200]. Another report says that the fruit is up to 20mm in diameter[235] and we have often seen fruits this size, or even a bit larger[K]. We find the fruits of the best forms to have an excellent flavour and juicy texture when fully ripe, but with a hint of bitterness before then[K]. They are one of the later members of this genus to ripen their fruit[K]. The fruit can be used in making pies, preserves, etc, and can also be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Northeastern N. America - Connecticut to Ontario, Illinois and Pennsylvania. Naturalized in Britain. ksacta Self-sown in hedges and rough ground in south-eastern England.

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Plants are hardy to at least -18°C[202]. A very variable species, it has been divided up into several different species by some botanists[82]. The sub-species C. pedicellata gloriosa. Sarg. has larger fruits than the type[11]. Hybridizes freely with other members of

this genus[200]. Seeding trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A user in Poland says that Crataegus pedicellata exists in the wild in Eastern Poland and can support winter temperatures at least until -30C.

3.2.4 Pyrus communis sativa

Pear

4 tlin 8 cyuc 5 kcak 3 tcan 0 dwat 5 m hkuc hmimhtwis cyutli hgattcup hwicli hrasjlytnyikfrip hpa7tli flatprikhwisslip hpa7tmwatli dyatxre7t hjonli

drutta Pyrus communis sativa is a deciduous Tree growing to 5 m (16ft 5in). 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. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked. The flavour ranges from rather harsh and astringent (cultivars used for making alcoholic drinks) through to soft, sweet and very juicy. The best dessert fruits have an exquisite sweet flavour, usually with a very soft flesh, whilst cooking varieties have harder less sweet flesh[K].

tcanta Dye WoodA yellow-tan dye is obtained from the leaves[106, 115]. Wood - heavy, tough, durable, fine grained, hard. Used by cabinet and instrument makers[11, 61, 100, 149]. When covered with black varnish it is an excellent ebony substitute[74].

nrakta A garden cultivar, probably derived from P. communis, P. cordata and P. nivalis[11]. ksacta Not known in the wild.

propta Seed - best sown in a cold frame as soon as it is ripe in the autumn, it will then usually germinate in mid to late winter. Stored seed requires 8 - 10 weeks cold stratification at 1°C and should be sown as early in the year as possible[200]. Temperatures over 15 - 20°C induce a secondary dormancy in the seed[200]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in a cold frame or greenhouse for their first year. Plant them out in late spring or early summer of the following year. The seed of pear cultivars will not usually breed true to type.

nwatta Prefers a good well-drained loam in full sun[200]. Grows well in heavy clay soils[200]. Tolerates light shade but does not fruit so well in such a position. Tolerates atmospheric pollution, excessive moisture and a range of soil types if they are moderately fertile, though plants can become chlorotic on very alkaline soils[200]. Established plants are drought tolerant[200]. Very hardy, tolerating temperatures down to below -15°C[200]. Widely cultivated for its edible fruit in temperate areas, there are many named varieties that can provide fruit from late July to April or May of the following year. This is the collective name for all the pear cultivars that have been derived from P. communis, probably through hybridization with P. cordata and P. nivalis. Where space is at a premium, or at the limits of their climatic range, pears can be grown against a wall. Most cultivars will grow well against a sunny south or west facing wall but, because of their relatively early flowering, they are not really suitable for north or east facing walls[219]. Most cultivars are not self-fertile and a number of cultivars have incompatible pollen, so care must be taken to ensure the provision of a suitable pollen partner[200]. Trees grow less well in grass, root secretions from the grass inhibiting the root growth of the pear[201]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern

branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

3.2.5 Hemerocallis middendorffii

Amur daylily, Middendorf, Daylily

4 tlin 8 cyuc 5 kcaek 2 tcan 1 dwat m hkuc
hmmimhtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flat-
prlikwis hpa7tmwatli xre7t hjonli

drutta Hemerocallis middendorffii is a PERENNIAL growing to 0.9 m (3ft) by 0.5 m (1ft 8in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers Leaves Shoots Edible Uses: Leaves and young shoots - cooked[105, 116, 177, 183]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177, 183]. The flowers can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205]. Plants form a spreading clump and are suitable for ground cover when spaced about 45cm apart each way[208]. The dead leaves should be left on the ground in the winter to ensure effective cover[208]. (This report was for a plant labelled H. middendorffiana, which I have assumed is a mis-spelling of this species[K]). Attractive flowers.

dwatta Antidote Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China, Japan, Korea. ksacta Meadows in high mountains of N. Japan[58]. Forests, forest margins, meadows and wet grasslands from near sea level to 2000 metres in China[266].

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

nwatta Landscape Uses: Border, Container, Ground cover, Massing, Seashore. Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. Individual flowers are short-lived, but the plant produces a succession of blooms and also flowers again in late summer[205]. The plant has a fibrous root system that does not extend far[205]. Plants take a year or two to become established after being moved but then form large clumps[200, 187]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. Special Features: Attractive foliage, Not North American native, Naturalizing, Attracts butterflies, Suitable for cut flowers, Fragrant flowers.

3.2.6 Crataegus missouriensis

4 tlin 8 cyuc 5 kcaek 0 tcan 2 dwat m hkuc
hmmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli
flatprlikwis hpa7tmwatli xre7t hjonli

drutta Crataegus missouriensis is a deciduous Tree growing to 6 m (19ft 8in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked. The size of a large cherry, the flesh is sweet, soft and fairly juicy[K]. The fruit is only about 10mm thick according to another report[235]. The fruit ripens in mid to late September in southern Britain[K], it makes a delicious dessert fruit and can also be used in making pies, preserves etc[K]. The fruit can be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotoxic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta South-eastern N. America - Virginia to North Carolina and Missouri. ksacta Rocky bluffs and river banks[235].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. This species has a good potential as a fruit crop in Britain. It regularly produces heavy crops of high quality, the tree is very easily grown and is little troubled by pests or diseases. It also requires very little attention, once the trees are established virtually the only work needed is to harvest the fruit each year[K]. A plant growing at Hillier Arboretum was about 3 metres tall (with a trunk 2 metres long) and 3 metres wide, it was fruiting well in 1993 and 1994[K]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before

start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

3.2.7 *Amelanchier alnifolia*

Saskatoon, Saskatoon serviceberry, Serviceberry
4 tlin 6 cyuc 5 kcaak 3 tcan 2 dwat 4 m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyikfrrip hpa7tli flatprik-
wis hpa7tmwattli fyifxre7t hjonli

drutta Amelanchier alnifolia is a deciduous Shrub growing to 4 m (13ft) by 3 m (9ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 2 and is not frost tender. It is in flower in May, and the seeds ripen from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit**Edible Uses:** Tea**Edible fruit** - raw or cooked[3, 11, 46, 62, 101]. The fruit ripens in mid summer (early July in southern Britain), it is soft and juicy with a few small seeds in the centre. A very nice sweet flavour that is enjoyed by almost everyone who tries it, there is a hint of apple in the taste[K]. About the size of a black-currant, the fruit is produced in small clusters and the best wild forms can be 15mm in diameter[200, 212]. The fruit can also be dried and used as raisins or made into pemmican[101, 183]. The fruit is rich in iron and copper[226]. The leaves are a tea substitute[161, 257].

tcanta Shelterbelt Soil stabilizationPlants have a spreading, suckering root system and are used in windbreaks for erosion control[200]. Young branches can be twisted to make a rope[257]. Wood - hard, straight grained, tough. Used for tool handles etc. The wood can be made even harder by heating it over a fire and it is easily moulded whilst still hot[99]. The young stems are used to make rims, handles and as a stiffening in basket making[257]. **Landscape Uses:** Erosion control, Massing, Woodland garden. Hedging and Screens, Architectural City and Courtyard Gardens Cottage and Informal Garden, Wildlife Gardens (RHS).

dwatta Appetizer Birthing aid Contraceptive Diaphoretic Febrifuge Laxative Ophthalmic StomachicSaskatoon was quite widely employed as a medicinal herb by the North American Indians, who used it to treat a wide range of minor complaints[257]. It is little used in modern herbalism. An infusion of the inner bark is used as a treatment for snow-blindness[172]. A decoction of the fruit juice is mildly laxative. It has been used in the treatment of upset stomachs, to restore the appetite in children, it is also applied externally as ear and eye drops[257]. A decoction of the roots has been used in the treatment of colds[257]. It has also been used as a treatment for too frequent menstruation[257]. A decoction of the stems, combined with the stems of snow-berry (*Symphoricarpos* spp) is diaphoretic. It has been used to induce sweating in the treatment of fevers, flu etc and also in the treatment of chest pains and lung infections[257]. A decoction of the plant, together with bitter cherry (*Prunus emarginata*) has been used as a contraceptive[257]. Other recipes involving this plant have also been used as contraceptives including a decoction of the ashes of the plant combined with the ashes of pine branches or buds[257]. A strong decoction of the bark was taken immediately after childbirth to hasten the dropping of the placenta. It was said to help clean out and help heal the woman's insides and also to stop her menstrual periods after the birth, thus acting as a form of birth control[257].

nrakta Western and Central N. America - Saskatchewan and south to Colorado and Idaho. ksacta Thickets, woodland edges and banks of streams[43] in moist well-drained soils[99, 200]. Small bushy forms grow on fairly dry hillsides[212].

propta Seed - it is best harvested 'green', when the seed is fully formed but before the seed coat has hardened, and then sown immediately in pots outdoors or in a cold frame.

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

nwatta Prefers a rich loamy soil in a sunny position or semi-shade[1, 200] but thrives in any soil that is not too dry or water-logged[11]. Plants are fairly lime tolerant[200], they also grow well in heavy clay soils. Hardy to about -20°C according to one report[184], whilst another suggests that this species is hardy to about -50°C[11]. All members of this genus have edible fruits and, whilst this is dry and uninteresting in some species, in many others it is sweet and juicy. Many of the species have potential for use in the garden as edible ornamentals. This species is particularly interesting because it is quite compact and produces an excellent quality quite large fruit[K]. The main draw-back to this genus is that birds adore the fruit and will often completely strip a tree before it is fully ripe[K]. A very variable species, ranging from a thicket-forming shrub to a small tree in the wild[229]. It is occasionally cultivated for its edible fruit, there are several named varieties[183]. A stoloniferous species, spreading by suckers to form a thicket[11]. Hybridizes freely with other members of this genus[200]. Grafting onto seedlings of *A. lamarckii* or *Sorbus aucuparia* is sometimes practised in order to avoid the potential problem of hybridizing[1]. **Special Features:**North American native. Blooms are very showy. The plant is heat tolerant in zones 8 through 3. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is multistemmed with multiple stems from the crown [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

3.2.8 *Hemerocallis middendorffii esculenta*

4 tlin 8 cyuc 5 kcaak 0 tcan 1 dwat m hkuc
hmmihmtut cyutli kyuctcup hwicli hrasjlutnyikfrrip hpa7tli flat-
prikliwis hpa7tmwattli xre7t hjonli

drutta Hemerocallis middendorffii esculenta is a PERENNIAL growing to 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers Leaves**Edible Uses:** Leaves and young shoots - cooked[105, 116, 177, 183]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 127, 177, 183]. The flowers are crisp and succulent with a deli-

skin-care creams[7]. It tones and whitens the skin, combats wrinkles, lightens freckles, soothes sunburn and whitens the teeth[244].

dwatta Astringent Diuretic Laxative TonicThe leaves and the fruit are astringent, diuretic, laxative and tonic[4, 9, 222]. The leaves are mainly used, though the fruits are an excellent food to take when feverish and are also effective in treating rheumatic gout[4]. A slice of strawberry is also excellent when applied externally to sunburnt skin[4]. A tea made from the leaves is a blood tonic[222]. It is used in the treatment of chilblains[53] and also as an external wash on sunburn[222]. The leaves are harvested in the summer and dried for later use[238]. The fruits contain salicylic acid and are beneficial in the treatment of liver and kidney complaints, as well as in the treatment of rheumatism and gout[244]. The roots are astringent and diuretic[4, 222]. A decoction is used internally in the treatment of diarrhoea and chronic dysentery[4, 244]. Externally it is used to treat chilblains and as a throat gargle[244]. The roots are harvested in the autumn and dried for later use[238].

nrakta E. Asia - China, Japan ksacta Meadows in high mountains, N. and C. Japan[58, 205]. Forests, forest margins, grassy slopes, stony places and roadsides at elevations of 500 - 2500 metres in China[266].

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. Individual flowers only live for one day[205]. Plants take a year or two to become established after being moved but then form large clumps[200, 187]. The roots are fibrous without any obvious swellings[205]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

3.2.9 *Fragaria vesca* 'Semperflorens'

Alpine Strawberry

4 tlin 8 cyuc 5 kcaok 0 tcan 3 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnykfrip hpa7tli flatprik-
wisslip hpa7tmwatli xre7t hjonli

drutta *Fragaria vesca* 'Semperflorens' is a PERENNIAL growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to November, and the seeds ripen from June to November. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ckakta Edible Parts: Fruit LeavesEdible Uses: Coffee TeaFruit - raw, cooked or made into preserves[183]. Sweet and succulent with an exquisite taste, they are far superior to the cultivated strawberry[K]. The fruit is fairly small, up to 15mm in diameter, but it is produced abundantly from early summer until the frosts of autumn[K]. Young leaves - raw or cooked[52, 105]. Added to salads or used as a potherb[183]. The fresh or dried leaves are used as a tea substitute[7, 177, 183]. The root has been used as a coffee substitute in India[240].

tcanta Compost TeethThe flowers are an alternative ingredient of 'Quick Return' herbal compost activator[32]. This is a dried and powdered mixture of several herbs that can be added to a compost heap in order to speed up bacterial activity and thus shorten the time needed to make the compost[K]. The fruit is used as a tooth cleaner[4]. The fresh fruit removes stains from teeth if it is allowed to remain for about 5 minutes[4]. The fruit is also used cosmetically in

skin-care creams[7]. It tones and whitens the skin, combats wrinkles, lightens freckles, soothes sunburn and whitens the teeth[244].

nrakta Most of Europe, including Britain, to temperate Asia. ksacta Woodland and damp undergrowth[7].

propta Seed - sow early spring in a greenhouse. The seed can take 4 weeks or more to germinate. The seedlings are very small and slow-growing at first, but then grow rapidly. Prick them out into individual pots when they are large enough to handle and plant them out during the summer.

nwatta Prefers a fertile, well-drained, moisture retentive soil in a sunny position[27, 200]. Tolerates semi-shade though fruit production will be reduced when plants are growing in such a position. Prefers some shade according to some reports[3, 31]. Plants are often found on clay soils[31] and on soils overlying chalk[13]. Alpine strawberries appreciate a mulch of pine or spruce leaves[18]. The alpine strawberry is often cultivated in the garden for its edible fruit. This fruit is fairly small but exquisitely flavoured and is freely produced from June to November. There are some named varieties[183]. It is not very feasible to grow this plant on a commercial scale because it is very labour intensive to pick and it is also hard to get the fruit to market in good quality. However, it is sometimes grown by specialised growers for the luxury market. The main drawback of growing this plant is that it tends to lose vigour after about 2 - 3 years, partly due to virus diseases and partly because the plant flowers and fruits so freely that it exhausts itself.

3.2.10 *Allium schoenoprasum sibiricum*

Giant Chives

4 tlin 8 cyuc 5 kcaok 2 tcan 2 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnykfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Allium schoenoprasum sibiricum* is a BULB growing to 0.3 m (1ft) by 0.3 m (1ft in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

ckakta Edible Parts: Flowers Leaves RootEdible Uses: Leaves - raw, cooked or dried for later use. The leaves have a mild onion flavour and are an excellent addition to mixed salads, they can also be used as a flavouring in soups etc[90, 105]. This form has a stronger garlic flavour than common chives[183]. The leaves are often available from late winter and can continue to produce leaves until early the following winter, especially if the plant is in a warm, sheltered position[K]. A good source of sulphur and iron[201]. The bulbs are rather small but can be used as spring onions[K]. They can be harvested with the leaves still attached and be used

Use spring onions[K]. They have a pleasant mild onion flavour. The flowers can be used as a garnish in salads etc[183]. The flowers of this species are rather dry and less desirable than the flowers of many other species[K].

cantata Fungicide RepellentThe juice of the plant is used as an insect repellent, it also has fungicidal properties and is effective against scab, mildew etc[14, 18, 20]. The growing plant is said to repel insects and moles[14, 20].

dwatta Appetizer Digestive Hypotensive TonicThe whole plant has a beneficial effect on the digestive system and the blood circulation. It improves the appetite, is digestive, hypotensive and tonic[201]. It has similar properties to garlic (*A. sativum*), but in a much milder form, and it is rarely used medicinally[238].

nrakta N. America to E. Asia - Siberia, Japan. ksacta Calcareous or basic rock, gravels and shores, Alaska and southwards[43].

propta Seed - sow spring in a cold frame. Germination is usually free and easy, pot up the seedlings as soon as they are large enough to handle easily and plant out in the following spring. Division can be carried out at almost any time of the year but is probably best done in spring. The clumps should be divided at least every 3 or 4 years in order to maintain vigour[200], the divisions can be planted out direct into their permanent positions.

nwatta An easily grown plant[203], it prefers a sunny position in a rich moist but well-drained soil[14, 37]. Succeeds in most soils[1, 37] and in light shade[203]. Grows well in heavy clay soils[203]. Tolerates a pH in the range 5.2 to 8.3. This is a more robust form of *A. schoenoprasum*, the chive. It is often grown in the garden for its edible leaves which are available from late winter to the beginning of the next winter[K]. The bulbs divide rapidly and large clumps are quickly formed. There are some named varieties[183]. Regular cutting of the leaves ensures a continuous supply of young leaves and prevents flowering[33]. Plants can be moved into a frame or other protected environment in the autumn and will then produce leaves throughout the winter[33]. Do not do this every year or it weakens the plants. The bulbs should be planted fairly deeply[1]. A good bee plant[24]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. Helps to reduce the incidence of scab when it is grown under apple trees[201]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233].

3.2.11 *Quercus robur*

Pedunculate Oak, English oak

4 tlin 8 cyuc 4 kcaek 5 tcan 3 dwat 30 m hkuc
hmmihtut cyutli hgattcuphja7n hwicli jlutnyikfrip hpa7tli flat-
prinklwis hpa7tmwatli hjonli

drutta *Quercus robur* is a deciduous Tree growing to 30 m (98ft) by 30 m (98ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from April to May, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. It is noted for attracting wildlife. Suitable for: medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

pcista Possible digestive complaints. May delay absorption of alkaloids and other alkaline drugs [301].

kcakta Edible Parts: SeedEdible Uses: Coffee Gum-Seed - cooked[2, 5, 8, 13]. Nourishing but indigestible[4]. Chopped and roasted, the seed is used as an almond substitute[8]. It can be dried, ground into a powder and used as a thickening in stews etc or mixed with cereals for making bread[183]. The seed contains bitter tannins, these can be leached out by thoroughly washing the seed in running water though many minerals will also be lost[63]. Either the whole seed can be used or the seed can be dried and ground it into a powder. It can take several days or even weeks to properly leach whole seeds, one method was to wrap them in a cloth bag and place them in a stream. Leaching the powder

is quicker. A simple taste test can tell when the tannin has been leached. The traditional method of preparing the seed was to bury it in boggy ground overwinter. The germinating seed was dug up in the spring when it would have lost most of its astringency. The roasted seed is a coffee substitute[21, 61]. An edible gum is obtained from the bark[177]. Another report says that an edible manna is obtained from the plant and that it is used instead of butter in cooking[183]. This report probably refers to the gum[K].

cantata Basketry Charcoal Compost Fuel Gum Ink Repellent Tannin WoodA mulch of the leaves repels slugs, grubs etc, though fresh leaves should not be used as these can inhibit plant growth[20, 201]. The bark is an ingredient of 'Quick Return' herbal compost activator[32]. This is a dried and powdered mixture of several herbs that can be added to a compost heap in order to speed up bacterial activity and thus shorten the time needed to make the compost[K]. The bark is very rich in calcium[18]. Oak galls are excrescences that are sometimes produced in great numbers on the tree and are caused by the activity of the larvae of different insects. The insects live inside these galls, obtaining their nutrient therein. When the insect pupates and leaves, the gall can be used as a rich source of tannin, that can also be used as a dyestuff[4]. A black dye and an excellent long-lasting ink is made from the oak galls, mixed with salts of iron[4, 7, 66]. The colour is not very durable[4]. When mixed with alum, the dye is brown and with salts of tin it is yellow[4]. Trees can be coppiced to provide material for basket making, fuel, construction etc[23]. The wood is a source of tar, quaiacol, acetic acid, creosote and tannin[123]. Tannin is extracted commercially from the bark and is also found in the leaves[223]. On a 10% moisture basis, the bark contains 11.6% tannin and the wood 9.2%[223]. The bark strips easily from the wood in April and May[4]. A purplish dye is obtained from an infusion of the bark with a small quantity of coppers[4]. It is not bright, but is said to be durable[4]. Wood - hard, tough, durable even under water - highly valued for furniture, construction etc[4, 13, 61, 66]. It is also a good fuel[6] and charcoal[61].

dwatta Antiseptic Astringent Bach Decongestant Dysentery Haemostatic TonicThe oak tree has a long history of medicinal use. It is anti-inflammatory, antiseptic, astringent, decongestant, haemostatic and tonic[4, 7, 9, 13, 21, 165]. The bark is the part of the plant that is most commonly used[4], though other parts such as the galls, seeds and seed cups are also sometimes used[7]. A decoction of the bark is useful in the treatment of chronic diarrhoea, dysentery, intermittent fevers, haemorrhages etc[4]. Externally, it is used to bathe wounds, skin eruptions, sweaty feet, piles etc[9]. It is also used as a vaginal douche for genital inflammations and discharge, and also as a wash for throat and mouth infections[9]. The bark is harvested from branches 5 - 12 years old, and is dried for later use[9]. Any galls produced on the tree are strongly astringent and can be used in the treatment of haemorrhages, chronic diarrhoea, dysentery etc[4]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Despondency', 'Despair, but never ceasing effort'[209]. A homeopathic remedy is made from the bark. It is used in the treatment of disorders of the spleen and gall bladder[9]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Quercus robur* Pedunculate Oak for coughs/bronchitis, diarrhoea, inflammation of mouth and pharynx, inflammation of the skin (see [302] for critics of commission E).

nrakta Europe, including Britain, from Scandinavia south and east to Spain, the Urals and Crimea. ksacta Often the dominant woodland tree, especially on clay soils and in the eastern half of Britain, but avoiding acid peat and shallow limestone soils[17].

propta Seed - it quickly loses viability if it is allowed to dry out. It can be stored moist and cool overwinter but is best sown as soon as it is ripe in an outdoor seed bed, though it must be protected from mice, squirrels etc. Small quantities of seed can be sown in deep pots in a cold frame. Plants produce a deep taproot and need to be planted out into their permanent positions as soon as possible, in fact seed sown in situ will produce the best trees[11]. Trees should not be left in a nursery bed for more than 2 growing seasons without being moved or they will transplant very badly.

nwatta Prefers a good deep fertile loam which can be on the stiff side[11]. Young plants tolerate reasonable levels of side shade[200]. Succeeds in heavy clay soils[13] and in

met soils so long as the ground is not water-logged for long periods[186]. Dislikes dry or shallow soils but is otherwise drought tolerant once it is established[186]. Tolerant of exposed sites though it dislikes salt-laden winds[186]. The oak is a very important timber tree in Britain, it is also a very important food plant for the caterpillars of many species of butterfly[30], there are 284 insect species associated with this tree[24]. It has often been coppiced or pollarded for its wood in the past[23], though this should not be done too frequently[186], about once every 50 years is the average. The tree flowers on new growth produced in spring, the seed ripening in its first year[200, 229]. Older trees have a thick corky bark and this can protect them from forest fires, young trees will often regenerate from the base if cut down or killed back by a fire[186]. Intolerant of root disturbance, trees should be planted in their permanent positions whilst young[11]. Hybridizes freely with other members of the genus[200]. Immune to attacks by the tortrix moth[1]. This species is notably resistant to honey fungus[88, 200].

3.2.12 Acer saccharum

Sugar Maple, Florida Maple, Hard Maple, Rock Maple
4 tlin 8 cyuc 4 kcaak 4 tcan 2 dwat 30 m hkuc
hmmihtut cyutli tcup hwicli hrasljutnyikfrip hpa7tli frusflat-
prikwdis hpa7tmwatli xre7t hjonli

drutta Acer saccharum is a deciduous Tree growing to 30 m (98ft) by 12 m (39ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to May, and the seeds ripen from October to December. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very acidic soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It can tolerate atmospheric pollution.

kcakta Edible Parts: Inner bark Leaves Sap Seed Edible Uses: Sweetener The sap contains quite a large proportion of sugar. This can be used as a refreshing drink, or be concentrated into a syrup by boiling off the water[1, 2, 11, 34, 57]. The syrup is used as a sweetener on many foods. The sap can be harvested in late winter or early spring[142], the flow is best on a warm sunny day after a frost[213]. Trees on southern slopes in sandy soils give the best yields. It is best to make a hole about 7cm deep and about 1.3 metres above the ground[171]. Yields of 40 - 100 litres per tree can be obtained[142]. The best sap production comes from cold-winter areas with continental climates. The sap contains 2 - 6% sugar, thus about 32 litres are required to make a litre of maple syrup[229]. Self-sown seedlings, gathered in early spring, are eaten fresh or dried for later use[213]. Seeds - cooked. The wings are removed and the seeds boiled then eaten hot[62, 105, 159, 213]. The seed is about 6mm long and is produced in small clusters[82]. Inner bark - cooked. It is dried, ground into a powder and then used as a thickening in soups etc or mixed with cereals when making bread[105, 161]. The related Oregon Maple (*Acer macrophyllum*) has yellow flower clusters, sweet with nectar, eaten raw[183]. No information was found for this species.

tcanta Companion Fodder Fuel Potash Preservative Wood The leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. Wood - close grained, tough, hard, heavy, strong, not very durable, it takes a high polish, remains smooth under abrasion and has a high shock-resistance[46, 61, 82, 171, 227]. It holds nails well, is fair in gluing, dries easily and shrinks moderately[227]. The wood weighs 43lb per cubic foot[235]. Considered by many to be the most valuable hardwood tree in N. America, the sugar maple is used for a wide range of applications including furniture, flooring, turnery, musical instruments and ship building[46, 61, 82, 171, 227]. Accidental forms with the grain curled and contorted, known as curly maple and bird's eye maple, are common and are highly prized in cabinet making[82]. The wood is also a very good fuel, giving off a lot of heat and forming very hot embers[82, 226]. The ashes of the wood are rich in alkali and yield large quantities of potash[82]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta Blood tonic Diuretic Expectorant Hepatic Ophthalmic A tea made from the inner bark is a blood tonic, diuretic and expectorant[222]. It has been used in the treatment of coughs, diarrhoea etc[222]. A compound infusion of the bark has been used as drops in treating blindness[257]. The sap has been used for treating sore eyes[257]. The inner bark has been used as an expectorant and cough remedy[257]. Maple syrup is used in cough syrups and is also said to be a liver tonic and kidney cleanser[222].

nrakta Eastern N. America - Newfoundland to Georgia, west to Texas and Minnesota. ksacta Found in a variety of soil types, doing best in deep rich well-drained soils from sea level to 1600 metres[229]. Rich usually hilly woods[43].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. A lot of the seed is non-viable, it is best to cut a few open to see if there is an embryo[113]. An average of 95% germination can be achieved from viable seed[98]. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate, sometimes taking two years[125]. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter.

nwatta Agroforestry Services: Crop shade Fodder: Bank Management: Standard Regional Crop Staple Crop: Sugar/Landscape Uses: Firewood, Screen, Specimen, Street tree, Woodland garden. Of easy cultivation, it prefers a good moist well-drained soil but succeeds on most soils[11, 98], though it is more likely to become chlorotic as a result of iron deficiency on alkaline soils. Grows well in heavy clay soils. Trees need full light and a lot of space[98]. This species is one of the most shade tolerant of the N. American maples[226]. It tolerates atmospheric pollution[200] and so is often used as a street tree, though it can suffer from soil compaction and the use of salt on the roads in frosty weather. Tolerates a pH in the range 4.5 to 7.3. Hardy to about -45°C when fully dormant[160]. A fast-growing tree for its first 40 years in the wild[229], this species is not a great success in Britain[1], though it does better than once thought[11]. It grows well in Cornwall[59]. In cultivation it has proved to be slow growing when young[11]. Trees can live for 250 years in the wild[229]. A very ornamental tree[1] but a bad companion plant, inhibiting the growth of nearby plants[18, 20]. This species is commercially exploited in America for its sap[1, 11]. Along with its sub-species it is the major source of maple syrup[11]. There are some named varieties[183]. The sap can be tapped within 10 - 15 years from seed but it does not flow so well in areas with mild winters[160]. Special Features: Attracts birds, North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2]. The root pattern is a heart root, dividing from the crown into several primary roots going down and out [1-2].

3.2.13 Aesculus spp

Horse chestnut

4 tlin 9 cyuc 4 kcaak 4 tcan 4 dwat 30 m hku

hmimhtut cyutli kyucup hwicli hyhshrasjlutnykfrp hpa7tli flatprikliwis hpa7tmwatli hjonli

drutta *Aesculus* spp is a deciduous Tree growing to 30 m (98ft) by 25 m (82ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 4. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

pcista The seed is rich in saponins[10, 21, 65]. Although poisonous, saponins are poorly absorbed by the human body and so most pass through without harm. Saponins are quite bitter and can be found in many common foods such as some beans. They can be removed by carefully leaching the seed or flour in running water. Thorough cooking, and perhaps changing the cooking water once, will also normally remove most of them. However, it is not advisable to eat large quantities of food that contain saponins. Saponins are much more toxic to some creatures, such as fish, and hunting tribes have traditionally put large quantities of them in streams, lakes etc in order to stupefy or kill the fish[K]. Avoid in patients with kidney or liver disease. Avoid if taking warfarin as can interfere with anticoagulant therapy [301].

kcakta Edible Parts: SeedEdible Uses: The roasted seed is used as a coffee substitute[2, 7]. Seed - cooked. It can be dried, ground into a powder and used as a gruel[7, 46, 55, 61]. The seed is quite large, about 3cm in diameter, and is easily harvested. It is usually produced in abundance in Britain. Unfortunately the seed is also rich in saponins, these must be removed before it can be used as a food and this process also removes many of the minerals and vitamins, leaving behind mainly starch. See also the notes above on toxicity. The seed contains up to 40% water, 8 - 11% protein and 8 - 26% toxic saponins[218]. The following notes apply to *A. californica*, but are probably also relevant here:- The seed needs to be leached of toxins before it becomes safe to eat - the Indians would do this by slow-roasting the nuts (which would have rendered the saponins harmless) and then cutting them into thin slices, putting them into a cloth bag and rinsing them in a stream for 2 - 5 days[213].

tcanta Saponins in the seed are used as a soap substitute[169]. The saponins can be easily obtained by chopping the seed into small pieces and infusing them in hot water. This water can then be used for washing the body, clothes etc. Its main drawback is a lingering odour of horse chestnuts[K]. The seed contains variable amounts of saponins, up to a maximum of 10%[240]. A starch obtained from the seed is used in laundering[100]. The bark and other parts of the plant contain tannin, but the quantities are not given[223]. A yellow dye is obtained from the bark[4]. The flowers contain the dyestuff quercetin[223]. Wood - soft, light, not durable. Of little commercial value, it is used for furniture, boxes, charcoal[2, 11, 46, 61]. Carbon Farming Solutions - Industrial Crop: starch, medicinal (Crops grown for non-food uses. Industrial crops provide resources in three main categories: materials, chemicals, and energy. Traditional materials include lumber and thatch, paper and cardboard, and textiles) [1-11].

dwatta Various medicinal qualities depending on the species. They include: Alterative; Analgesic; Antiinflammatory; Antirheumatic; Astrigent; Bach; Diuretic; Expecto-rant; Febrifuge; Haemostatic; Narcotic; Tonic; Vasoconstrictor; Vulnerary.

nrakta N. Temperate. ksacta Trees and shrubs native to the temperate Northern Hemisphere, with six species native to North America and seven to 13 species native to Eurasia.

propta Seed - best sown outdoors or in a cold frame as soon as it is ripe[11, 80]. The seed germinates almost immediately and must be given protection from severe weather[130]. The seed has a very limited viability and must not be allowed to dry out. Stored seed should be soaked for 24 hours prior to sowing and even after this may still not be viable[80, 113]. It is best to sow the seed with its 'scar' downwards[130]. If sowing the seed in a cold frame, pot up the seedlings in early spring and plant them out into their

permanent positions in the summer.

nwatta Hypothetical Crop Industrial Crop: Medicinal Industrial Crop: Starch Management: StandardClimate: cold to warm temperate, Mediterranean.Humidity: semi-arid to humid. Landscape Uses: Firewood, Pollard, Specimen, Street tree. Prefers a deep loamy well-drained soil but is not too fussy tolerating poorer drier soils[11, 200]. Tolerates exposed positions and atmospheric pollution[200]. A very ornamental and fast-growing tree[1, 4], it succeeds in most areas of Britain but grows best in eastern and south-eastern England[200]. Trees are very hardy when dormant, but the young growth in spring can be damaged by late frosts. The flowers have a delicate honey-like perfume[245]. Trees are tolerant of drastic cutting back and can be severely lopped[200]. They are prone to suddenly losing old heavy branches[98]. The tree comes into bearing within 20 years from seed[98]. Most members of this genus transplant easily, even when fairly large[11]. Special Features: Attractive foliage, Not North American native, Naturalizing, Blooms are very showy. Carbon Farming Solutions - Cultivation: hypothetical. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

3.2.14 Acer saccharum nigrum

Black Maple

4 tlin 6 cyuc 4 kcaak 2 tcan 1 dwat 25 m hku

hmimhtut cyutli tjuw hwicli hrasjlutnykfrp hpa7tli flatprikliwis hpa7tmwatli hjonli

drutta *Acer saccharum nigrum* is a deciduous Tree growing to 25 m (82ft 0in) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 3. It is in flower in April, and the seeds ripen in October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Inner bark Sap SeedEdible Uses: SweetenerThe sap contains reasonable quantities of sugar and can be used as a drink or concentrated into a syrup by boiling off the water[1, 2, 11, 43, 34, 57, 142, 159]. The syrup is used as a sweetener on many foods. The sap can be harvested in late winter or early spring[142], the flow is best on a warm sunny day after a frost. Trees on southern slopes in sandy soils give the best yields. It is best to make a hole about 7cm deep and about 1.3 metres above the ground[171]. Yields of 40 - 100 litres per tree can be obtained[142]. The best sap production comes from cold-winter areas with continental climates. Seed - boiled then roasted[62, 105, 159]. The seed is about 6mm long and is produced in small clusters[82]. Inner bark - cooked. It is dried, ground into a powder and then used as a thickening in soups etc or mixed with cereals when making bread[105, 161].

tcanta Fuel Preservative WoodThe leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. Wood - close grained, tough, hard, heavy. Used for furniture, ship building, etc[43, 46, 61, 82, 171]. It is a good fuel[82]. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

dwatta AstrigentA decoction of the inner bark has been used in the treatment of diarrhoea[257].

nrakta Eastern N. America - Quebec to Alabama, west to South Dakota and Arkansas. ksacta Rich calcareous or alluvial woods[43]. Found in a variety of soil types, near streams, rivers and in rich woodlands, usually below 750 metres but up to 1650 metres in the south of its range[229].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. A lot of the seed is non-viable, it is best to cut a few open to see if there is an embryo[113]. An average of 95% germination can be achieved from viable seed[98]. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate, sometimes taking two years[125]. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very

plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter.

nwatta Landscape Uses:Specimen, Street tree. Of easy cultivation, it prefers a good moist well-drained soil but succeeds on most soils[11, 98]. Chlorosis can often develop as a result of iron deficiency when the plants are grown in alkaline soils, but in general maples are not fussy as to soil pH. Grows well in heavy clay soils. Trees need full light and a lot of space[98]. Plants are hardy to about -45°C when fully dormant[160]. This species is not a great success in Britain[1], though it does better than once thought[11]. It grows well in Cornwall[59]. Slow growing when young[11]. Plants produce prodigious root growth but very little top growth in first year from seed[133]. Trees grow rapidly for their first 25 years in the wild, but then slow down and only occasionally surviving for more than 200 years[229]. A very ornamental tree[1] but a bad companion plant, inhibiting the growth of nearby plants[18, 20]. This species is commercially exploited in America for its sap[1, 11]. Along with *A. saccharum* and the sub-species *A. s. grandidentatum* it is the major source of maple syrup[11]. There are some named varieties[183]. The sap can be tapped within 10 - 15 years from seed but it does not flow so well in areas with mild winters[160].
Special Features:North American native, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 8 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is flat with shallow roots forming a plate near the soil surface [1-2].

3.2.15 *Quercus bicolor*

Swamp White Oak

4 tlin 8 cyuc 4 kcaak 3 tcan 2 dwat 25 m hukc
hmimhtut cyutli tcuphja7n hwicli jlutnykfrif hpa7tli flat-prikwis hpa7tmwatali hjonli

drutta *Quercus bicolor* is a deciduous Tree growing to 25 m (82ft 0in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower in May, and the seeds ripen in 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: medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: Seed**Edible Uses:** CoffeeSeed - raw or cooked[105, 161, 226]. A rather sweet flavour[159, 235]. The seed is quite large, about 2 - 3cm long and 15 - 20mm wide[82, 200], and unlike most other oaks, is attached to the tree by a long stem[183]. It matures in its first year[235]. The seed can be dried, ground into a powder and used as a thickening in stews etc or mixed with cereals for making bread[183]. The seed from some trees can contain bitter tannins, these can be leached out by thoroughly washing the seed in running water though many minerals will also be lost. Either the whole seed can be used or the seed can be

dried and ground into a powder. It can take several days or even weeks to properly leach whole seeds, one method was to wrap them in a cloth bag and place them in a stream. Leaching the powder is quicker. A simple taste test can tell when the tannin has been leached. The traditional method of preparing the seed was to bury it in boggy ground overwinter. The germinating seed was dug up in the spring when it would have lost most of its astringency. Roasted seed is a coffee substitute.

tcanta Repellent Rust Tannin WoodThe leaves of most species in this genus are more or less rich in tannins. A mulch of the leaves can be placed around vulnerable plants in order to repel slugs, snails, grubs etc. Fresh leaves should be used with caution, since these can utilize some of the nitrogen in the soil and this inhibit plant growth[20, K J]. Oak galls are excrescences that are sometimes produced in great numbers on the tree and are caused by the activity of the larvae of different insects. The insects live inside these galls, obtaining their nutrient therein. When the insect pupates and leaves, the gall can be used as a rich source of tannin, that can also be used as a dyestuff[4]. The bark has been boiled with hemlock (*Tsuga* sp.?) and soft maple bark (*Acer* spp), and the liquid used to remove rust. The mixture was also believed to prevent rust[257]. The wood is close-grained, strong, hard, tough, heavy[46, 82, 171, 229]. It weighs 48lb per cubic foot[235]. Trees do not self-prune and dead branches remain on the trees for many years. This does mean that the wood is usually quite knotty[226]. The wood machines well, though it can check and warp if not dried properly. It is of some importance commercially. And is used for construction, cabinet making, furniture, interior finishes, veneers, fence posts etc[6, 82, 171, 229, 338, 1050]. The wood makes a good fuel.

dwatta Astringent DysenteryAny galls produced on the tree are strongly astringent and can be used in the treatment of haemorrhages, chronic diarrhoea, dysentery etc[4].

nrakta Eastern N. America - Quebec to Minnesota, Georgia and Arkansas. ksacta Bottomlands, stream margins and swamps[43]. Tolerant of poorly drained sites, it is frequently found in heavy mucky soils[229].

propta Seed - it quickly loses viability if it is allowed to dry out. It can be stored moist and cool overwinter but is best sown as soon as it is ripe in an outdoor seed bed, though it must be protected from mice, squirrels etc. Small quantities of seed can be sown in deep pots in a cold frame. Plants produce a deep taproot and need to be planted out into their permanent positions as soon as possible, in fact seed sown in situ will produce the best trees[11]. Trees should not be left in a nursery bed for more than 2 growing seasons without being moved or they will transplant very badly.

nwatta Landscape Uses:Pest tolerant, Specimen, Street tree. Prefers a good deep fertile loam which can be on the stiff side[1, 11]. Young plants tolerate reasonable levels of side shade[200]. Tolerates moderate exposure, surviving well but being somewhat stunted[200]. Prefers warmer summers than are usually experienced in Britain, trees often grow poorly in this country and fail to properly ripen their wood resulting in frost damage overwinter[200]. A relatively fast-growing tree in the wild, living 300 - 350 years[229], though it is relatively shallow-rooted and is considerably more susceptible to forest fires than most other oaks[226]. This species is one of the best of the white oaks for growing in this country[1]. However, it is said that the seed is rarely formed in Britain[105]. The tree flowers on new growth produced in spring, the seed ripening in its first year[200, 229]. Trees do not commence bearing until about 25 - 30 years old, large crops being produced every 3 - 5 years[229]. Intolerant of root disturbance, trees should be planted in their permanent positions whilst young[11]. The seed of this species is attached to the tree by unusually long (by oak tree standards) stems[183]. Hybridizes freely with other members of the genus[200]. Plants in this genus are notably resistant to honey fungus[200].
Special Features: Attracts birds, North American native, Attracts butterflies, 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 (120 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

3.2.16 *Prunus cerasifera divaricata*

4 tlin 8 cyuc 4 kcaok 0 tcan 1 dwat 10 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Prunus cerasifera divaricata* is a deciduous Tree growing to 10 m (32ft 10in). See above for USDA hardiness. It is hardy to UK zone 4. It is in flower from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw or cooked[74]. Tastes like a Mirabelle plum[2, 11]. A very pleasant plum-like flavour when fully ripe with a mealy though juicy flesh[K]. It is high in citric acid, containing about 4.7%[74]. The fruit is about 30mm in diameter and contains one large seed[200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta Dye Rootstock Used as a rootstock for plums, peaches and apricots[74]. A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168].

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

nrakta S.E. Europe to W. Asia. ksacta Mountain slopes in woody or shrubby thickets, on stony slopes, ravine bottoms, near water and montane river valleys to 2000 metres[74].

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

nwatta Requires a well-drained moisture retentive soil[11, 200]. Succeeds in light shade but fruits better in a sunny position[11, 200]. Thrives in a loamy soil, doing well on limestone[11]. Grows well in heavy clay soils. Prefers some chalk in the soil but apt to become chlorotic if too much is present[1]. Plants are hardy to about -25°C[184]. According to some botanists this plant should be named *P. divaricata* and *P. cerasifera* should be named *P. divaricata cerasifera*[11]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200].

3.2.17 *Crataegus holmesiana*

Holmes' hawthorn

4 tlin 8 cyuc 4 kcaok 0 tcan 2 dwat 10 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli
flatprikwislip hpa7tmwatli xre7t hjonli

drutta *Crataegus holmesiana* is a deciduous Tree growing to 10 m (32ft) by 8 m (26ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soil. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked. An excellent dessert fruit, it has an acid yet sweet flavour, is juicy but with a mealy texture, it makes very pleasant eating[K]. Some forms have fruits with a disagreeable flavour[82]. The fruit can also be used in making pies, preserves etc, and can be dried for later use. The fruit is about 10mm in diameter[200]. A specimen at Cambridge Botanical garden has fruits up to 20mm in diameter[K]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiac Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern N. America - Ontario to Maine, south to New York and Pennsylvania. ksacta Rich moist hillsides and the borders of streams and swamps[82].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them out in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hawthorns in general hybridize freely with other members of the genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish.

This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A very ornamental plant[11].

3.2.18 *Crataegus douglasii*

Black Hawthorn

4 tlin 8 cyuc 4 kcak 0 tcan 2 dwat 9 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnykfrip hpa7tli
flatprkklwissli hpa7tmwatli xre7t hjonli

drutta *Crataegus douglasii* is a deciduous Tree growing to 9 m (29ft 6in). See above for USDA hardness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[2, 3, 95, 99, 101]. A very pleasant flavour with a sweet and juicy succulent flesh[46, 82, K], it makes an excellent dessert fruit and can be eaten in quantity[K]. The fruit can also be used for making pies, preserves etc, and can be dried for later use[183]. The fruit is about 8mm in diameter and is borne in small clusters[200]. The fruits I have eaten have been considerably larger than this[K]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Needles WoodThe spines on the branches are used as needles for lancing boils, removing splinters etc[99]. Wood - close-grained, heavy, hard and tough. Used for tool handles etc[82, 99, 101].

dwatta Antirheumatic Astringent Cardiotonic Dysentery Hypotensive Poultice StomachicAn infusion of the shoots has been used to treat diarrhoea in children and sores in babies' mouths[257]. A poultice of the chewed leaves has been applied to swellings[257]. An infusion of the bark has been used in the treatment of diarrhoea and dysentery[257]. An infusion of the sapwood, bark and roots has been used as a stomach medicine[257]. The thorns have been used as a treatment for arthritis[257]. The point of the thorn was used to pierce an area affected by arthritic pain. The other end of the thorn was ignited and burned down to the point buried into the skin. This treatment was very painful but it was said that after a scab had formed and disappeared, the arthritic pain had also disappeared[257]. The thorns have been used as probes for boils and ulcers[257]. Although no other specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Western N. America - British Columbia to Michigan, south to California. ksacta Open woods, banks of mountain streams and on rocky banks[43, 82].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to

pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit; they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

3.2.19 *Crataegus acclivis*

4 tlin 8 cyuc 4 kcak 0 tcan 2 dwat 8 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnykfrip hpa7tli
flatprkklwissli hpa7tmwatli xre7t hjonli

drutta *Crataegus acclivis* is a deciduous Tree growing to 8 m (26ft) by 7 m (23ft). See above for USDA hardness. It is hardy to UK zone 5 and is not frost tender. It is in flower from April to May, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked[K]. The fruit ripens in early September, it is about 18mm long with a pleasantly sweet juicy flesh and makes an excellent dessert fruit[K]. The fruit contains up to 5 seeds in the centre, these usually stick together and so the effect is like eating a cherry with its single large seed[K].

dwatta Cardiac HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta North-eastern N. America - New York to the borders of southern Canada. ksacta Banks of streams and steep gorges[235].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year,

planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Plants are hardy to at least -18°C[202]. We have very little specific information on this plant, and it is regarded as no more than a form of *C. pedicellata* by most botanists[235]. However, a tree seen at Kew in early September 1997 had a good crop of almost ripe fruit. This fruit was more elongated than *C. pedicellata* and was also ripe about 4 weeks before that species[K]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

3.2.20 *Crataegus submollis*

Quebec Hawthorn

4 tlin 8 cyuc 4 kcak 0 tcan 2 dwat 7 m hkuc
hmmihmtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrrip hpa7tli
flatprikwiwslip hpa7tmwatli xre7t hjonli

drutta *Crataegus submollis* is a deciduous Tree growing to 7 m (23ft) by 7 m (23ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[105, 161]. Sub-acid, dry and mealy[82]. Our experience has been that the fruit is sweet and somewhat juicy, it has a thick flesh with a nice flavour and makes an acceptable dessert fruit[K]. The fruit can also be used in making pies, preserves etc, and can be dried for later use[257]. It is about 20mm in diameter, is borne in large clusters and is easily harvested[K]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Hedge Hedge Plants are very tolerant of trimming and will soon resprout even if cut back into very old wood. They can be used as a hedge[50]. Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta North-eastern N. America - Quebec to Ontario, Massachusetts and New York. ksacta Wooded hillsides and open fertile ground[43]. Rich damp hillsides and the borders of woods and roads[82].

propta Seed - best sown in a cold frame as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Plants are hardy to about -18°C[202]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. This species is sometimes confused with *C. coccinea*[50]. It is also very close to *C. mollis*, differing in having 10 stamens to a flower (as compared to 20 in *C. mollis*)[202]. It is considered to be part of *C. mollis* by some botanists[229].

3.2.21 *Pyrus bretschneideri*

4 tlin 8 cyuc 4 kcak 0 tcan 0 dwat 6 m hkuc
hmmihmtut cyutli hgattcup hwicli hrasjlutnyikfrrip hpa7tli flat-
prikwiw hpa7tmwatli xre7t hjonli

drutta *Pyrus bretschneideri* is a deciduous Tree growing to 6 m (19ft 8in). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in May, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[177, 200]. The fruit is up to 3cm in diameter[200].

nrakta E. Asia - N. China. ksacta Slopes, dry cold regions at elevations of 100 - 2000 metres[266].

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

nwatta Prefers a good well-drained loam in full sun[200]. Grows well in heavy clay soils. Tolerates light shade but does not fruit so well in such a position. Tolerates atmospheric pollution, excessive moisture and a range of soil types if they

are moderately fertile[200]. Established plants are drought tolerant[200]. Plants are hardy to at least -15°C[200]. This species is closely related to *P. ussuriensis ovoidea*[200]. This species is commonly cultivated in northern China, preferring sunny, dry, loamy soils. It includes many important forms with excellent fruit[266]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

3.2.22 *Crataegus succulenta*

Fleshy hawthorn

4 tlin 8 cyuc 4 kcaak 2 tcan 2 dwat 6 m hkuc
hmmihtut cyutli hgatkyuctuphja7n hwicli hrasjlutnyikfrp
hpa7tli flatprikwlwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus succulenta* is a deciduous Shrub growing to 6 m (19ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[62, 101, 105]. Excellent for making jellies[183], it can also be dried for later use. A small fruit with a sweet, juicy and pulpy flesh[82, 183], it is up to 17mm in diameter[235]. Another report says that the fruit is large for a *Crataegus* species, it is about 35mm in diameter and is borne in small clusters[200]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern N. America - Nova Scotia to North Carolina, west to Montana, Colorado and Utah. ksacta Thickets, pastures and woodland edges, especially in dry or rocky soils[43].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively

moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. This species is closely related to *C. tomentosa*[11].

3.2.23 *Crataegus drobrivensis*

Caughuawaga Hawthorn

4 tlin 8 cyuc 4 kcaak 2 tcan 2 dwat 5 m hkuc
hmmihtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrp hpa7tli
flatprikwlwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus drobrivensis* is a deciduous Shrub growing to 5 m (16ft) by 5 m (16ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked. A reasonable size, it is up to 15mm in diameter[200], and is very acceptable for raw eating[K]. It is sweet and fairly juicy when fully ripe with a hint of apple in its flavour[K]. The fruit can be used in making pies, preserves, etc, and can also be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta North-eastern N. America. ksacta Not known in a truly wild situation, it is possibly a hybrid *C. pruinosa* x *C. suborbiculata*[43].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily planted plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. A very hardy plant, tolerating temperatures down to about -18°C[202]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. Probably a natural hybrid, *C. pruinosa* x *C. suborbiculata*[43].

3.2.24 *Chaenomeles cathayensis*

Chinese Quince

4 tlin 8 cyuc 4 kcaok 0 tcan 2 dwat 3 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Chaenomeles cathayensis* is a deciduous Shrub growing to 3 m (9ft) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in April, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - very harsh raw but fragrant when cooked[1, 3, 4, 11, 177]. It makes an excellent jelly[183] and a very good jam, it is especially good cooked with apples in apple pies[K]. The fruit is very large and can be 15cm long and 9cm wide[200].

dwatta Antiemetic Antirheumatic Antispasmodic DigestiveThe fruit is antiemetic, antirheumatic, antispasmodic and digestive[176]. It is used in the treatment of rheumatic pain, convulsions of the calf muscles, vomiting, dyspepsia and diarrhoea[176].

nrakta E. Asia - China. ksacta Scrub and hedges in W. Hubei[184]. Slopes, forest margins and roadsides at elevations of 900 - 2500 metres[266].

propta Seed - best sown as soon as it is ripe in a sheltered position outdoors or in a cold frame[200]. Sow stored seed in February in a greenhouse[78]. Germination usually takes place within 6 weeks[78]. Prick out the seedlings into individual pots as soon as they are large enough to handle. If well grown, these seedling can be large enough to plant out in the summer, but give them some protection in their first winter. Otherwise plant them out in late spring of the following year[K]. Cuttings of half-ripe wood, July/August in a frame[11]. Cuttings of mature wood of the current year's growth, November in a cold frame. Layering in late spring or in autumn. This is a sure and easy method, though it takes 12 months[78, 200].

nwatta Easily cultivated in any reasonably good soil[1, 200]. Prefers a deep moist well-drained loam[4, 11]. Grows well in heavy clay soils. Tolerates full shade but requires a sunny position for best fruit production[3, 11, 200]. Becomes chlorotic on very alkaline soils[188, 200]. Tolerates atmospheric pollution[200]. A very ornamental plant[1], it is hardy to about -25°C[200]. Plants are subject to canker, especially when growing in the milder moister areas of Britain[49]. Plants in this genus are notably resistant to honey fungus[200]. Fruits are usually freely produced in Britain, but they do not always ripen[11, 182]. The plant grows and fruits well on a south wall at Kew[K]. A good bee plant, flowering early in the year and providing pollen and nectar[108]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in

choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

3.2.25 *Sambucus caerulea*

Blue Elder

4 tlin 8 cyuc 4 kcaok 3 tcan 2 dwat 3 m hkuc
hmmihtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flat-
prikwis hpa7tmwatli xre7t hjonli

drutta *Sambucus caerulea* is a deciduous Shrub growing to 3 m (9ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from June to July, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

pcista The leaves, green fruits and stems of some (if not all) members of this genus are poisonous[9, 76, 226]. The fruit of this species has been known to cause stomach upsets to some people. Any toxin the fruit might contain is liable to be of very low toxicity and is destroyed when the fruit is cooked[65, 76].

kcakta Edible Parts: Flowers FruitEdible Uses: TeaFruit - raw, cooked or used in preserves[2, 3, 15, 85, 94, 183, 257]. Rather sweet and juicy but full of small seeds[82, 256], this is the best flavoured of the North American elders[212]. The fruit is rather nice raw, seven people ate and enjoyed a small quantity of the raw fruit with no ill effects[K]. The fruit can be dried for later use[257]. A somewhat rank taste fresh[101], the fruit is usually dried before being used[183]. The fruit is about 6mm in diameter and is borne in large clusters[200]. Some caution is advised, see the notes above on toxicity. Flowers - raw or cooked in fritters etc[15, 85, 94, 183]. Very pleasant and refreshing raw[K]. A pleasant tea is made from the dried flowers[62, 183].

tcanta Musical Repellent Tinder WoodA decoction of the leaves, when watered on plants, repels caterpillars[94]. The dried flower stems repel insects and rodents[101]. The hollow stems can be used as flutes and pipes[257]. The pith of the stems has been used as a tinder for lighting fires[257]. Wood - light, soft, weak, coarse grained. Of no commercial value, though it is used locally for flutes, skewers, pegs, straws etc[82, 94, 99, 229].

dwatta Analgesic Antiseptic Astringent Diaphoretic Emetic Febrifuge Haemostatic Laxative Pectoral Salve Stomachic TonicHaemostatic[94]. An infusion or extract made from the flowers, bark and root has been used to cure fevers and gripe, it is also laxative[226]. A decoction of the plant has been used as an antiseptic wash to treat itches[257]. The bark is analgesic and astringent[257]. An infusion has been used in the treatment of diarrhoea and rheumatism[257]. A decoction has been used as a wash in the treatment of swellings and pain[257]. An ointment made by mixing the bark with fat has been used externally in the treatment of burns, ulcers, skin irritations etc[226]. The fresh bark has been placed in a tooth cavity to ease the pain of toothache[257]. The inner bark is strongly emetic[257]. The leaves are analgesic, antiseptic, diaphoretic, febrifuge and purgative[257]. A decoction has been used in the treatment of new colds[257]. An infusion of the leaves and flowers has been used as a steam bath in the treatment of colds and headaches[257]. A decoction of the leaves has been used as an antiseptic wash on limbs affected by blood poisoning[257]. The crushed leaves have been used as a poultice to treat burns and swollen hands[257]. A decoction of the root has been used in the treatment of bladder problems and dyspepsia[257]. A decoction of the flowers has been used in the treatment of stomach troubles and lung complaints[257]. Applied externally, it has been used to treat sprains and bruises and as an antiseptic wash for open sores and itches[257]. A wine made from the fruit has been used as a tonic[257].

nrakta Western N. America - British Columbia to California, east to Montana, Texas and Mexico. ksacta Gravelly,

rather dry soils on stream banks, margins of fields, woodlands etc[62, 82].

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

nwatta Tolerates most soils, including chalk[200], but prefers a moist loamy soil[11, 200]. Grows well in heavy clay soils. Tolerates some shade but is best in a sunny position[1]. Tolerates atmospheric pollution and coastal situations[200]. A fast-growing but short-lived tree in the wild[229]. A shrub at Kew in September 1993 was carrying a good crop of tasty fruits[K]. Plants in this genus are notably resistant to honey fungus[200].

3.2.26 *Berberis buxifolia*

Magellan Barberry

4 tlin 8 cyuc 4 kcak 1 tcan 2 dwat 2.5 m hkuc
hmimhtut cyutli kyuctcup hwicli hyishrasjlutnyikfrrip hpa7tli flatpriklwis hpa7tmwatli fyfixre7t hjonli

drukta *Berberis buxifolia* is an evergreen Shrub growing to 2.5 m (8ft) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf all year, in flower in April. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or used in preserves[3, 11, 69, 139, 177]. Freely borne in Britain. Large and black with a pleasant flavour, they are eaten out of hand[183]. Said to be the best flavoured of the South American barberries, the fruit is hardly acid and but slightly astringent[2]. The green unripe fruits can be used like gooseberries in pies etc[2, 183]. The fruits are about 8mm long[200].

tcanta Dye Hedge HedgeA yellow dye is obtained from the root[139]. The dwarf form, var. 'Nana' makes a good dwarf hedge to 1 metre tall[182].

dwatta Antibacterial Cancer Dysentery Berberine, universally present in rhizomes of *Berberis* species, has marked antibacterial effects. Since it is not appreciably absorbed by the body, it is used orally in the treatment of various enteric infections, especially bacterial dysentery[218]. It should not be used with *Glycyrrhiza* species (Liquorice) because this nullifies the effects of the berberine[218]. Berberine has also shown antitumour activity[218].

nrakta S. America - S. Chile and S. Argentina. Occasionally naturalized in Britain[17]. ksacta Coastal scrub, forest margins, clearings and moister areas in grass[69].

propta Seed - best sown as soon as it is ripe in a cold frame, when it should germinate in late winter or early spring[78]. Seed from over-ripe fruit will take longer to germinate[78], whilst stored seed may require cold stratification and should be sown in a cold frame as early in the year as possible[80]. The seedlings are subject to damping off, so should be kept well ventilated[113]. When the seedlings are large enough to handle, prick them out into individual pots and grow them on in a cold frame. If growth is sufficient, it can be possible to plant them out into their permanent positions in the autumn, but generally it is best to leave them in the cold frame for the winter and plant them out in late spring or early summer of the following year. Cuttings of half-ripe wood, July/August in a frame. Roots in 4 - 8 weeks[113]. Pot up in spring[113]. Cuttings of mature wood of the current season's growth, preferably with a heel, October/November in a frame[78].

nwatta Prefers a warm moist loamy soil and light shade but it is by no means fastidious, succeeding in thin, dry and shallow soils and in full sun[11, 200]. Grows well in heavy clay soils. Plants are hardy to about -15°C[184], but they can be deciduous in cold winters[188]. The dwarf *B. buxifolia nana* is the form of this species that is most commonly found growing in Britain. It is very free flowering but to date (1994) we have not seen this form bearing fruit[K]. The species is supposed to be self-fertile so it is possible that this form is sterile. Hybridizes freely with other members of this genus[1]. Plants can be pruned back quite severely and resprout well from the base[200].

3.2.27 *Rosa villosa*

Apple Rose

4 tlin 8 cyuc 4 kcak 1 tcan 1 dwat 1.8 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrrip hpa7tli flatpriklwis hpa7tmwatli fyfixre7t hjonli

drukta *Rosa villosa* is a deciduous Shrub growing to 1.8 m (6ft). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower from June to August, and the seeds ripen from August to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Fruit Seed Edible Uses: Tea Fruit - raw or cooked[2, 3, 46, 61, 105]. A pleasant acid pulp, the fruit can also be used in preserves, jams etc[183]. The fruit is about 30mm in diameter[200], but there is only a thin layer of flesh surrounding the many seeds[K]. Rich in vitamin C, there is 1303mg per 100g (fresh weight) of fruit[142]. Some care has to be taken when eating this fruit, see the notes above on known hazards. The seed is a good source of vitamin E, it can be ground into a powder and mixed with flour or added to other foods as a supplement[102, 183]. Be sure to remove the seed hairs[102]. The leaves are used as a tea substitute[46, 61, 183]. A pleasant tasting fruity-flavoured tea is made from the dried fruit[21, 46].

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

nrakta Europe, including Britain, from Scandinavia south and east to Spain, the Caucasus, W. Asia to Iran. ksacta Woods, hedgerows, scrub etc[17].

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

long and plant them in a sheltered position outdoors or in a cold frame[78, 200]. The cuttings can take 12 months to establish but a high percentage of them normally succeed[78]. Division of suckers in the dormant season. Plant them out direct into their permanent positions. Layering. Takes 12 months[11].

nwatta Succeeds in most well-drained soils[11], preferring a circumneutral soil and a sunny position[200]. Grows well in heavy clay soils. Dislikes water-logged soils[200]. Grows well with alliums, parsley, mignonette and lupins[18, 20]. Garlic planted nearby can help protect the plant from disease and insect predation[18, 20]. Grows badly with boxwood[18]. Formerly cultivated for its edible fruit which, from selected plants, can be 4cm wide[11]. There are some named varieties, 'Wolley Dod' has large fruits with a good flavour[183]. The flowers are semi-double, heavily scented and sweetly fragrant[183]. The foliage has an aroma like ripe apples[245]. Plants often produce suckers[200]. Hybridizes freely with other members of this genus[80]. Plants in this genus are notably susceptible to honey fungus[200]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) 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].

3.2.28 *Astrebla squarrosa*

Bull Mitchell grass
4 tlin 12 cyuc 4 kcaak 1 tcan 0 dwat 1.5 m hkuc
htut cyutli hgatkyuctcup hwicli hyishrasjlutnyikfripr hpa7tli flatprikwlis hpa7tmwatli hjonli

drutta *Astrebla squarrosa* is a PERENNIAL growing to 1.5 m (5ft) by 0.1 m (0ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 10. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure.

kcakta Edible Parts: SeedEdible Uses: Carbon Farming Solutions - Staple Crop: balanced carb (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1]. Cultivated in the past but largely or completely abandoned.

tcanta Providing habitat for organisms such as mammals.

nrakta Australasia. ksacta Heavy, cracking clays on plains and river flats, sometimes with *Lysiphillum* or *Excoecaria*, or in *Dicanthium-Eulalia* grassland and cleared Brigalow areas; flowers after rain.

propta Wild. Seed.

nwatta Historic Crop Management: Standard Staple Crop: Balanced carbClimate: subtropical to tropical. Humidity: semi-arid. Grow on clay soils, mainly between an upper limit of 600 mm average annual rainfall, and a lower limit of 200 mm, and even below in depressions where the water concentrates following rains e.g. in Sturt's Stony Desert. Mitchell grasses are deep rooted and become dormant during drought, allowing them to survive extended periods without rainfall. Carbon Farming Solutions - Cultivation: historic crop. Cultivated in the past but largely or completely abandoned. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

3.2.29 *Hemerocallis fulva longituba*

4 tlin 8 cyuc 4 kcaak 2 tcan 1 dwat 1 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfripr hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Hemerocallis fulva longituba* is a PERENNIAL growing to 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to August. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline)

soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers Leaves RootEdible Uses: Leaves and young shoots - cooked[105, 116]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. They can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked[205]. A pleasant nutty flavour.

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - C. and S. Japan ksacta Long cultivated, the plant is not known in the wild

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[200] but tolerating partial shade. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. Unlike the type species, this form does produce viable seed[187]. Plants take a year or two to become established after being moved[200]. Individual flowers are short-lived, opening in the morning and withering in the evening. The plant, however, produces a succession of flowers over a period of about 6 weeks[205]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

3.2.30 *Hemerocallis exaltata*

4 tlin 8 cyuc 4 kcaak 0 tcan 1 dwat 1 m hkuc
hmimhtut cyutli kyuctcup hwicli hrasjlutnyikfripr hpa7tli flatprikwlis hpa7tmwatli xre7t hjonli

drutta *Hemerocallis exaltata* is a PERENNIAL growing to 1 m (3ft 3in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers LeavesEdible Uses: Leaves and young shoots - cooked[116, 205]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. They can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nkrakta E. Asia - Japan, it is only found on Tobishima Island, a small islet off W. Japan. ksacta Meadows[187].

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil[200, 205]. Grows well in heavy clay soils. Succeeding in sun or shade, it produces more flowers in a sunny position though these flowers can be shorter-lived in very sunny positions[205]. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. This species is hardy to about -15°C[187]. Hybridizes freely with other members of this genus[200]. Some roots are short and enlarged, others long with spindle-shaped tuberous ends. The plant forms a compact clump[233], but it also produces rhizomes that tend to spread[205]. Individual flowers are very short-lived, they open in the morning and wither in the evening[205]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

3.2.31 *Hemerocallis lilioasphodelus*

Yellow Day Lily

4 tlin 8 cyuc 4 kcak 2 tcen 2 dwat 0.6 m hkuc
hmimhtut cyutli kyuctup hwicli hrasjlutnyikfrip hpa7tli flat-
priklwis hpa7tmwatli fyfxre7t hjonli

drutta *Hemerocallis lilioasphodelus* is a PERENNIAL growing to 0.6 m (2ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to July. The species is hermaphrodite (has both male and female organs) and is pollinated by insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers Leaves Root Shoots Edible Uses: Leaves and young shoots - raw or cooked like asparagus or celery[85, 105, 183]. They must be consumed when very young or else they become fibrous[K]. Flower buds - raw or cooked. They taste somewhat like green beans[85, 105]. They contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Flowers - raw or cooked[85, K]. They can be dried and used as a thickener in soups etc[183]. If the flowers are picked just as they start to wither they can be used as a condiment[85]. The flowers are a traditional food in China where they are steamed and then dried[266]. Root - cooked[85, 105]. They taste like a blend of sweet corn and salsify[183]. We have found them to be tender but fairly bland with a slight sweetness[K]. The swollen roots are quite small and are only really worthwhile using if the plant is being dug up for divisions or some other reason[K].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205]. Plants form a spreading clump and are suitable for ground cover when spaced about 45cm apart each way[208]. The dead leaves should be left on the ground in the winter to ensure effective cover[208].

dwatta Antidote Cancer Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. The root also has a folk history of use in the treatment of cancer - extracts from the roots have shown antitumour activity[218]. A tea made from the boiled roots is used as a diuretic[205].

nkrakta Original habitat is obscure, possibly China. An occasional garden escape in Britain. ksacta Rocky mountain woods, wet meadows and riversides on foothills of the S.E. Alps in Europe[50].

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88, 111]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Plants are very cold-hardy, tolerating temperatures down to about -25°C[187]. A very vigorous plant, spreading by underground rhizomes[1]. The plant has a fibrous root system with occasional spindle-like swellings[205]. Cultivated as a food and medicinal plant in Japan[127]. Individual flowers are short-lived, they open at night and last for 20 - 76 hours. The plant produces a succession of blooms over a period of about 2 months[205]. The flowers are fragrant[205]. The flowers have a honeysuckle-like scent and this can pervade the air for a considerable distance when warmed by the summer sunshine[245]. Hybridizes freely with other members of this genus[200]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. The plant is heat tolerant in zones 12 through 2. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is tuberous with swollen potato-like roots [1-2].

3.2.32 *Hemerocallis thunbergii*

4 tlin 8 cyuc 4 kcak 2 tcen 1 dwat 0.5 m hkuc
hmimhtut cyutli kyuctup hwicli hrasjlutnyikfrip hpa7tli flat-
priklwis hpa7tmwatli xre7t hjonli

drutta *Hemerocallis thunbergii* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers Leaves Edible Uses: Leaves and young shoots - cooked[205]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. The flowers can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205]. Attractive Flowers. dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - N. China, Japan, Korea. ksacta Mountains in C. and S. Japan[58].

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. Plants take a year or two to become established after being moved[200]. They increase by means of runners[205] and form loose spreading clumps[K]. The roots are not swollen[233]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. The fragrant flowers are very short-lived, they open in the late afternoon and die in the morning[200, 205]. However, plants produce a succession of flowers for several weeks of the summer, each scape carrying between 4 and 20 blooms[205].

3.2.33 *Hemerocallis multiflora*

4 tlin 8 cyuc 4 kcaok 0 tcan 1 dwat m hkuc
hmmihtut cyutli kyuctup hwicli hrasjlutnyikfripr hpa7tli flat-
prikwlis hpa7tmwatli xre7t hjonli

drutta *Hemerocallis multiflora* is a PERENNIAL growing to 1 m (3ft 3in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from July to September. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kackta Edible Parts: Flowers Leaves RootEdible Uses: Leaves and young shoots - cooked[205]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked. Relatively small for a day lily, but the flowers are crisp with a pleasant sweetness and no aftertaste - they make a delicious addition to salads[K]. The flowers can also be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked[K]. We have found them to be tender but fairly bland with a slight sweetness[K]. The roots are slightly fleshy, with a swollen, tuberous part near the tip[266]. The swollen roots are quite small and are only really worthwhile using if the plant is being dug up for divisions or some other reason[K].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China in Hunan, Japan. ksacta Hill forests and openings in forests on hilltops at elevations of 700 - 1000 metres in China[266].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[11] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. This species is closely related to *H. micrantha* and *H. plicata*[205]. Individual flowers are short-lived but the plant produces a succession of blooms. Each scape carries between 75 and 100 blooms[205]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

3.2.34 *Hemerocallis littorea*

Coastal Day Lily

4 tlin 8 cyuc 4 kcaok 2 tcan 1 dwat 0.9 m hkuc
hmmihtut cyutli kyuctup hwicli hrasjlutnyikfripr hpa7tli flat-
prikwlis hpa7tmwatli xre7t hjonli

drutta *Hemerocallis littorea* is a PERENNIAL growing to 0.9 m (3ft) by 0.6 m (2ft in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from August to September, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kackta Edible Parts: Flowers Leaves RootEdible Uses: Leaves and young shoots - cooked. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. They can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked. A pleasant nutty flavour. This sub-species has a fibrous root system[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205]. Attractive flowers.

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - Japan. ksacta Grassy places near the sea[58, 187].

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[200] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Plants are hardy to about -15°C[187]. The plant has a fibrous root system[205]. Individual flowers are short-lived, opening in the morning and withering in the evening.

The plant, however, produces a succession of flowers over a period of about 6 weeks[205]. Hybridizes freely with other members of this genus[200]. Unlike the type species, this form does produce viable seed[187]. Plants take a year or two to become established after being moved[200]. They can then spread quite freely[K]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

3.2.35 *Hemerocallis minor*

Grassleaf Day Lily, Small daylily

4 tlin 8 cyuc 4 kcaak 2 tcan 1 dwat m hkuc
hmimhtut cyutli kyuctup hwicli hrasjlutnyikfrp hpa7tli flat-
prikklwis hpa7tmwatli xre7t hjonli

drutta *Hemerocallis minor* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.5 m (1ft 8in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers Leaves RootEdible Uses: Leaves and young shoots - cooked[2, 20, 46, 61, 183]. They must be consumed when very young or else they become fibrous[K]. One report says that eating these leaves appears to stimulate or intoxicate to some extent[2]. Flowers and flower buds - raw or cooked[2, 20, 46, 61]. Considered to be a great delicacy[177]. The flowers are a traditional food in China where they are steamed and then dried[266]. The flowers can be dried and used as a relish or a thickener in soups etc[178, 183]. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked[183, 205]. A radish-like flavour but not so sharp[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Anodyne Antidote Cancer Diuretic Febrifuge Vitamin CAnodyne, antidote, diuretic, febrifuge[178]. The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. The root also has a folk history of use in the treatment of cancer - extracts from the roots have shown antitumour activity[218]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - N. China, Korea. ksacta Water meadows, elevated wet places with sandy soils, forest glades, mountain slopes and scrub[74].

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. A very cold-hardy plant, tolerating temperatures down to about -25°C[187]. Hybridizes freely with other members of this genus[200]. A very ornamental plant, its roots are slender and not tuberous, whilst the rhizomes are not spreading[187]. The roots sometimes have bulbous swellings at their tips[205]. The flowers open in the evening and live for about 2 days[205]. The flowers have a powerful scent of

honeyuckle[245]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

3.2.36 *Crataegus mollis*

Red Haw, Downy hawthorn

4 tlin 8 cyuc 4 kcaak 2 tcan 2 dwat m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrp hpa7tli
flatprikklwis hpa7tmwatli xre7t hjonli

drutta *Crataegus mollis* is a deciduous Tree growing to 9 m (29ft) by 12 m (39ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: TeaFruit - raw or cooked[22, 46, 62, 101, 183]. Sub-acid, dry and mealy[82, 227]. The fruit is also used for making jellies and preserves[61, 95, 183]. Fairly large, it is about 20 - 25mm in diameter[200], with a thick flesh[229]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K]. A tea-like beverage can be made from the twigs[257].

tcanta Hedge HedgeThe plant is tolerant of being trimmed and will even resprout if cut back into very old wood. It can be used as a hedge[50]. Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotoxic HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern and Central N. America - Ontario to Alabama, west to Oklahoma. ksacta Open woods, usually in alluvial or fertile soils[43]. Frequently found in limestone soils[229].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta Landscape Uses:Espalier, Pollard, Specimen, Street tree. A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on

alk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. A very hardy plant, tolerating temperatures down to at least -18°C[202]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A very ornamental plant[11], the branches are almost thornless[229]. A rather variable species, it has been separated into several different species by some botanists[82]. This species is much confused with *C. chrysocarpa*[11] and with *C. coccinea*[50]. It is very closely related to *C. submollis*, differing in having 20 stamens to a flower (as compared to 10 in *C. submollis*)[202]. Special Features: North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 6 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. The root pattern is a tap root similar to a carrot going directly down [1-2].

3.2.37 *Hemerocallis dumortieri*

Dumortier's daylily

4 tlin 8 cyuc 4 kcaok 3 tcan 1 dwat 0.5 m hkuc
hmmhtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flat-
prikliwv hpa7tmwatli xre7t hjonli

drutta *Hemerocallis dumortieri* is a PERENNIAL growing to 0.5 m (1ft 8in) by 0.6 m (2ft). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers Leaves Shoots Edible Uses: Leaves and young shoots - cooked[105, 177, 183]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177, 205]. The flowers are crisp and juicy with a pleasant sweetness and no unpleasant after-taste[K]. They can be dried and used as a thickener in soups etc[183]. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked.

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205]. Plants form a slowly spreading clump and are suitable for ground cover when spaced about 45cm apart each way[208]. The dead leaves should be left on the ground in the winter to ensure effective cover[208].

dwatta Antidote Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - Japan, Korea. ksacta Meadows in the mountains of N. and C. Japan[58, 187].

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil[200]. Grows well in heavy clay soils. Succeeding in sun or shade, it produces more flowers in a sunny position though these flowers can be shorter-lived in very sunny positions[205]. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. This species is hardy to about -20°C[187]. Hybridizes freely with other members of this genus[200]. Individual flowers only live for one day[205]. The flowers are sweetly scented[245]. Plants form a tight clump that spreads slowly[K]. The roots are cylindrical[205]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

3.2.38 *Hemerocallis yezoensis*

4 tlin 8 cyuc 4 kcaok 0 tcan 1 dwat 0.8 m hkuc
hmmhtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flat-
prikliwv hpa7tmwatli xre7t hjonli

drutta *Hemerocallis yezoensis* is a PERENNIAL growing to 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from May to June. The species is hermaphrodite (has both male and female organs). Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers Leaves Edible Uses: Leaves and young shoots - cooked[105, 177]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[205]. The flowers can be dried and used as a thickener in soups etc. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205].

tcanta Weaving The tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin C The juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China, Japan, Korea. ksacta Grassy places and marshy meadows near the sea[187].

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil and a sunny position[111] but tolerating partial shade[88]. Plants flower less freely in a shady position though the flowers can last longer in such a position[205]. Grows well in heavy clay soils. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. A very cold-hardy plant, tolerating temperatures down to about -25°C[187]. The roots are slender and not swollen[187]. The scapes carry between 4 and 12 blooms[205]. Hybridizes freely with other members of this

genus[200]. It is closely related to *H. vespertina* Hara.[58]. Plants take a year or two to become established after being moved[200]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200].

3.2.39 *Hemerocallis citrina*

Citron daylily

4 tlin 8 cyuc 4 kcaak 2 tcan 1 dwat 0.8 m hkuc
hmmihmtut cyutli kyuctcup hwicli hrasjlutnyikfrip hpa7tli flatprikkwis hpa7tmwatli dyatxre7t hjonli

drutta *Hemerocallis citrina* is a PERENNIAL growing to 0.8 m (2ft 7in) by 0.8 m (2ft 7in). See above for USDA hardiness. It is hardy to UK zone 4 and is not frost tender. It is in flower from June to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

ksakta Edible Parts: Flowers Leaves RootEdible Uses: Leaves and young shoots - cooked[205]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked[105, 177]. The flowers can be dried and used as a thickener in soups etc. The slender trumpets vary from 12 - 17cm long[205]. There can be from 7 to 65 buds on a flowering stem[205]. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked[205]. The flavour is somewhat radish-like but not so sharp[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China. ksakta Forest margins, grassy areas and slopes along valleys from near sea level to 2000 metres[266].

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

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil[200]. Grows well in heavy clay soils. Succeeding in sun or shade, it produces more flowers in a sunny position though these flowers can be shorter-lived in very sunny positions[205]. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Plants are hardy to at least -20°C[187]. Widely cultivated in China for its edible flowers, especially in Hunan province[266]. Hybridizes freely with other members of this genus[200]. This species is said to be self-incompatible[127, 205]. Many of the plants in cultivation under this name are *H. thunbergii*[205]. The sub-species *H. citrina vespertina* (Hara.) Erhardt. is a very free-flowering form, producing up to 75 buds per scape and capable of flowering from July to October if the weather is suitable[205]. The plant forms a loose spreading clump[K]. The roots form pseudobulbs[205]. Plants take a year or two to become established after being moved[1]. Plants seem to be immune to the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. Individual flowers are very short-lived, they open in the late afternoon and die in the morning[200]. However, plants produce a succession of flowers for several weeks of the summer. The number of flowers on a scape varies from 7 to 65[205]. The flowers have a

lemmony scent[205]. Another report says that they have a pronounced honeysuckle scent[245].

3.2.40 *Cornus mas*

Cornelian Cherry, Cornelian Cherry Dogwood

4 tlin 8 cyuc 4 kcaak 3 tcan 2 dwat m hkuc
hmmihmtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikkwis hpa7tmwatli xre7t hjonli

drutta *Cornus mas* is a deciduous Shrub growing to 5 m (16ft) by 5 m (16ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from February to March, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

ksakta Edible Parts: Fruit Oil OilEdible Uses: Coffee Oil OilFruit - raw, dried or used in preserves[2, 3, 7, 9, 13, 183]. Juicy, with a nice acid flavour[11]. The fully ripe fruit has a somewhat plum-like flavour and texture and is very nice eating, but the unripe fruit is rather astringent[K]. It is rather low in pectin and so needs to be used with other fruit when making jam[9]. At one time the fruit was kept in brine and used like olives[183]. The fruit is a reasonable size, up to 15mm long, with a single large seed[K]. A small amount of edible oil can be extracted from the seeds[7]. Seeds are roasted, ground into a powder and used as a coffee substitute[183].

tcanta Dye Hedge Hedge Oil Oil Tannin WoodAn oil is obtained from the seed[7]. A dye is obtained from the bark[3, 7]. No more details are given. Another report says that a red dye is obtained from the plant, but does not say which part of the plant[4]. The leaves are a good source of tannin[7]. Wood - very hard, it is highly valued by turners[7]. The wood is heavier than water and does not float[7]. It is used for tools, machine parts, etc[7, 11, 13, 61].

dwatta Astringent Cholera Febrifuge NutritiveThe bark and the fruit are astringent, febrifuge and nutritive[7]. The astringent fruit is a good treatment for bowel complaints and fevers, whilst it is also used in the treatment of cholera[4, 254]. The flowers are used in the treatment of diarrhoea[4].

nrakta Europe. Naturalized in Britain[17]. ksakta Woodlands, especially in calcareous soils[7, 13].

propta Seed - best sown as soon as it is ripe in a cold frame or in an outdoors seedbed if there is sufficient seed[80, 113]. The seed must be separated from the fruit flesh since this contains germination inhibitors[80, 164]. Stored seed should be cold stratified for 3 - 4 months and sown as early as possible in the year[164]. Scarification may also help as may a period of warm stratification before the cold stratification[80, 164]. Germination, especially of stored seed, can be very slow, taking 18 months or more[164]. Prick out the seedlings of cold-frame sown seeds into individual pots as soon as they are large enough to handle and grow the plants on for their first winter in a greenhouse, planting out in the spring after the last expected frosts. Cuttings of half-ripe side shoots, July/August in a frame[188]. Cuttings of mature wood of the current year's growth, taken with a heel if possible, autumn in a cold frame. High percentage[78]. Layering of new growth in June/July. Takes 9 months[78].

nwatta Landscape Uses:Border, Firewood, Pest tolerant, Hedge, Screen, Specimen, Woodland garden. An easily grown plant, it succeeds in any soil of good or moderate fertility[1], ranging from acid to shallow chalk[200]. Grows well in heavy clay soils. Prefers a moist soil[108] and a sunny position[15] but also succeeds in light shade[188]. Plants are fairly wind resistant[K]. Plants grow and crop well in pots. A very hardy plant, tolerating temperatures down to about -25°C[184]. At one time the cornelian cherry was frequently cultivated for its edible fruit, though it has fallen into virtual disuse as a fruit crop in most areas[3]. It is still being cultivated in parts of C. Europe and there are some named varieties[183]. 'Macrocarpa' has larger fruits than the type[182]. 'Nana' is a dwarf form, derived from a yellow-fruited clone[182]. 'Variegata' has been seen on a number of occasions with very large crops of fruit, even in years when

type species has not fructified well[K]. 'Jolico' has well-flavoured fruits 3 times larger than the species. There are also a number of cultivars with yellow, white and purplish fruit. Seedlings can take up to 20 years to come into fruit. Plants produced from cuttings come into fruit when much younger, though they do not live as long as the seedlings. A very ornamental plant[1] it flowers quite early in the year and is a valuable early food for bees[13, 108]. Plants in this genus are notably resistant to honey fungus[200]. Special Features: Attracts birds, Not North American native, Attractive flowers or blooms. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

3.2.41 *Mentha x villosa alopecuroides*

Apple Mint, Bowles' Mint

4 tlin 8 cyuc 4 kcak 3 tcan 2 dwat 0.6 m hkuc
hmimhtut cyutli tcup hwicli hras|lutnykfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drueta *Mentha x villosa alopecuroides* is a PERENNIAL growing to 0.6 m (2ft) by 1 m (3ft 3in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Leaves Edible Uses: Condiment Tea Leaves - raw or cooked[14]. A strong spearmint flavour, they are used as a flavouring in salads or cooked foods[183], this is also the main species that is used to make mint sauce. A herb tea is made from the fresh or dried leaves[21, 183].

tcanta Essential Repellent Strewing An essential oil is obtained from the whole plant. The plant repels insects and was formerly used as a strewing herb[14, 18, 20]. Rats and mice intensely dislike the smell of mint. The plant was therefore used in homes as a strewing herb and has also been spread in granaries to keep the rodents off the grain[244].

dwatta Antiseptic Carminative Febrifuge Apple mint, like many other members of this genus, is often used as a domestic herbal remedy, being valued especially for its antiseptic properties and its beneficial effect on the digestion. Like other members of the genus, it is best not used by pregnant women because large doses can cause an abortion. A tea made from the leaves of most mint species has traditionally been used in the treatment of fevers, headaches, digestive disorders and various minor ailments[222]. The leaves are harvested as the plant comes into flower and can be dried for later use[238]. The essential oil in the leaves is antiseptic, though it is toxic in large doses[222].

nrakta Central and southern Europe, including Britain, Mediterranean region, Azores. ksacta Roadsides and in ditches in the S. and W. of England[5, 17]. Probably a hybrid, *M. spicata* x *M. suaveolens*.

propta Seed - sow spring in a cold frame. Germination is usually fairly quick. Prick out the seedlings into individual

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

nwatta A very easily grown plant, it succeeds in most soils and situations so long as the soil is not too dry[1, 200]. Grows well in heavy clay soils. Prefers a slightly acid soil[16]. A sunny position is best for the production of essential oils, but the plant also succeeds in partial shade. Apple mint is commonly grown in the herb garden. There is at least one named variety, 'Bowles mint' is said to be a superior form and it is the form usually cultivated commercially for mint sauce. Unlike most members of the genus, this species is resistant to the disease 'rust'[238]. Most mints have fairly aggressive spreading roots and, unless you have the space to let them roam, they need to be restrained by some means such as planting them in containers that are buried in the soil[K]. Hybridizes freely with other members of this genus. The whole plant has a strong aroma of spearmint. The flowers are very attractive to bees and butterflies[24]. A good companion for growing near cabbages and tomatoes, helping to keep them free of insect pests[14, 20]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons [1-2]. The root pattern is rhizomatous with underground stems sending roots and shoots along their length [1-2]. The root pattern is stoloniferous rooting from creeping stems above the ground [1-2].

4 5 tlin

4.0.1 *Cornus kousa*

Japanese Dogwood, Kousa dogwood, Chinese Dogwood,

5 tlin 8 cyuc 5 kcak 2 tcan 0 dwat 10 m hkuc
hmimhtut cyutli tcup hwicli hras|lutnykfrip hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drueta *Cornus kousa* is a deciduous Tree growing to 10 m (32ft) by 6 m (19ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Fruit Leaves Edible Uses: Fruit - raw or cooked[61, 177]. Sweet and juicy[11, 183], it is very nice in small quantities[K]. Very seedy[105]. The skin is rather tough and unpleasant, but the pulp is delicious with a custard-like texture, it is one of our favourite late summer fruits[K]. The fruit is about 2cm in diameter[200]. Young leaves - cooked[105, 177, 183].

tcanta Wood Wood - very hard and heavy. Used for pallets etc[151].

nrakta E. Asia - China, Japan, Korea. ksacta Woods and scrub in the mountains of Sichuan[109]. Valleys, shaded slopes, by streams and roadsides, in mixed, sparse, and dense woods at elevations of 400 - 2200 metres[266].

propta Seed - best sown as soon as it is ripe in a cold frame or in an outdoors seedbed if there is sufficient seed[80, 113]. The seed must be separated from the fruit flesh since this contains germination inhibitors[80, 164]. Stored seed

should be cold stratified for 3 - 4 months and sown as early as possible in the year[164]. Scarification may also help as may a period of warm stratification before the cold stratification[80, 164]. Germination, especially of stored seed, can be very slow, taking 18 months or more[164]. Prick out the seedlings of cold-frame sown seeds into individual pots as soon as they are large enough to handle and grow the plants on for their first winter in a greenhouse, planting out in the spring after the last expected frosts. Cuttings of half-ripe side shoots, July/August in a frame[188]. Cuttings of mature wood of the current year's growth, taken with a heel if possible, autumn in a cold frame. High percentage[78]. Layering of new growth in June/July. Takes 9 months[78].

nwatta Landscape Uses:Pest tolerant, Specimen, Woodland garden. An easily grown plant, it succeeds in any soil of good or moderate fertility, from acid to slightly alkaline but dislikes shallow chalky soils[184, 188]. Grows well in heavy clay soils. Prefers a rich well-drained loamy soil and a position that is at least partially sunny[11]. A very ornamental plant[1], it is hardy to about -20°C[184]. A number of named forms have been developed for their ornamental value[182]. Plants are slow-growing when young, they speed up somewhat after a few years but then soon slow down again[202]. The sub-species of *C. kousa chinensis* grows more freely, flowering and fruiting better in Britain though it barely differs in appearance from the species[11]. This species has been known to hybridize with *C. capitata*[182]. The cultivar 'Norman Hadden' could be such a hybrid[182]. Plants in this genus are notably resistant to honey fungus[200]. Special Features:Attracts birds, Not North American native, Blooms are very showy. The plant is heat tolerant in zones 8 through 5. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a standard with a non-suckering single trunk [1-2].

4.0.2 *Cornus kousa chinensis*

Japanese Dogwood

5 tlin 8 cyuc 5 kcaak 2 tcan 0 dwat 10 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrp hpa7tli flatprik-
wis hpa7tmwatli xre7t hjonli

drutta *Cornus kousa chinensis* is a deciduous Tree growing to 10 m (32ft) by 6 m (19ft). See above for USDA hardiness. It is hardy to UK zone 5. It is in flower in June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcaakta Edible Parts: Fruit Leaves Edible Uses: Fruit - raw or cooked[61, 177]. Sweet and juicy[11, 183], it is very nice in small quantities[K]. Very seedy[105]. The skin is rather tough and unpleasant, but the pulp is delicious with a custard-like texture[K]. This fruit gained very high marks from a group of 7 people in a fruit-tasting visit to various gardens[K]. The fruit is about 2cm in diameter[200]. Young leaves - cooked[105, 177, 183].

tcanta WoodWood - very hard and heavy. Used for mallets etc[151].

nrakta E. Asia - China. ksacta Thickets, 1200 - 2200 metres[109].

propta Seed - best sown as soon as it is ripe in a cold frame or in an outdoors seedbed if there is sufficient seed[80, 113]. The seed must be separated from the fruit flesh since this contains germination inhibitors[80, 164]. Stored seed should be cold stratified for 3 - 4 months and sown as early as possible in the year[164]. Scarification may also help as

may a period of warm stratification before the cold stratification[80, 164]. Germination, especially of stored seed, can be very slow, taking 18 months or more[164]. Prick out the seedlings of cold-frame sown seeds into individual pots as soon as they are large enough to handle and grow the plants on for their first winter in a greenhouse, planting out in the spring after the last expected frosts. Cuttings of half-ripe side shoots, July/August in a frame[188]. Cuttings of mature wood of the current year's growth, taken with a heel if possible, autumn in a cold frame. High percentage[78]. Layering of new growth in June/July. Takes 9 months[78].

nwatta An easily grown plant, it succeeds in any soil of good or moderate fertility[1], ranging from acid to shallow chalk[200]. Does not like chalky soils according to other reports[184, 188]. Grows well in heavy clay soils. Prefers a rich well-drained loamy soil and a position that is at least partially sunny[11]. A very ornamental plant[1], it is hardy to about -20°C[184]. A number of named forms have been developed for their ornamental value[182]. Plants are slow-growing when young, they speed up somewhat after a few years but then soon slow down again[202]. This sub-species of *C. kousa* grows more freely, flowering and fruiting better in Britain though it barely differs in appearance from the species[11]. Plants in this genus are notably resistant to honey fungus[200].

4.0.3 *Crataegus pennsylvanica*

5 tlin 9 cyuc 5 kcaak 0 tcan 2 dwat 9 m hkuc
hmimhtut cyutli hgattcupha7n hwicli hrasjlutnyikfrp hpa7tli
flatprikwlisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus pennsylvanica* is a deciduous Tree growing to 9 m (29ft 6in). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcaakta Fruit - raw or cooked. A very good size fruit, up to 25mm in diameter, with a lovely semi-sweet flavour even when semi-ripe, it makes a delicious dessert[K]. It is also sometimes made into jellies[82] and can be dried for later use. The fruit is borne in clusters of 4- 12 and is very easily harvested[82, K]. There are up to five fairly large seeds in the centre of each fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern N. America - Delaware to Pennsylvania and W. Virginia. ksacta Open woods and thickets in moist fertile soils[43]. Meadows in low, moist soils[82].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to

pot up to the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. This species has a good potential as a fruit crop in Britain. It regularly produces heavy crops of high quality, the tree is very easily grown and is little troubled by pests or diseases. It also requires very little attention, once the trees are established virtually the only work needed is to harvest the fruit each year[K]. A tree about 5 metres tall and wide at Kew fruits regularly and very heavily[K]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

4.0.4 *Crataegus arnoldiana*

Arnold Hawthorn

5 tlin 9 cyuc 5 kcaak 0 tcan 2 dwat 7 m hkuc
hmimhtut cyutli hgatkuyctcuphja7n hwicli hrasjlutnyikfrp
hpa7tli flatprkikwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus arnoldiana* is a deciduous Tree growing to 7 m (23ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[105, 177]. Sub-acid[82]. A delicious flavour, it is sweet with a soft juicy flesh and makes an excellent dessert fruit[K]. It can also be cooked and used in pies, preserves etc and can be dried for later use. The fruit ripens in early September in southern Britain[K]. The fruit is about 2cm in diameter[K]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific

mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use.

The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta North-eastern N. America - Massachusetts and Connecticut. ksacta Wooded banks[43]. Thickets on a dry bank[82].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year.

Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. This is a tree with an excellent potential as a fruit crop in Britain. The fruit is of very good quality and is freely borne, whilst the tree is of very easy cultivation and rarely troubled by pests or diseases[K]. A tree at the Hillier Arboretum in September 1993 was about 3 metres tall and 1.5 metres wide. The growth looked somewhat weak and the tree was leaning due to wind rock but it was carrying a heavy crop of fruit[K]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. A very ornamental plant[1], it is very closely related to *C. mollis*, and considered to be part of that species by many botanists[229]. Hybridizes freely with other members of this genus[200]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

4.0.5 *Crataegus ellwangeriana*

Scarlet Hawthorn

5 tlin 7 cyuc 5 kcaak 2 tcan 2 dwat 6 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrp hpa7tli
flatprkikwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus ellwangeriana* is a deciduous Tree growing to 6 m (19ft) by 6 m (19ft). See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in flower in May, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or

cooked. Juicy and acid[82]. An excellent dessert fruit, it has

an acid yet sweet flavour, is juicy but with a mealy texture, it

makes very pleasant eating[K]. The fruit can also be used in

making pies, preserves etc, and can be dried for later use. A

reasonable size, it is about 15mm in diameter[200]. A speci-

men at Kew has fruits up to 25mm in diameter[K]. There are

up to five fairly large seeds in the centre of the fruit, these

often stick together and so the effect is of eating a cherry-like

fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful

for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern N. America. ksacta Not known in the wild, it is possibly of hybrid origin.

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. This species is possibly of hybrid origin, involving *C. pedicellata*, though some botanists view it as no more than part of *C. pedicellata*[82]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A very ornamental plant[11].

4.0.6 *Crataegus schraderana*

Blue hawthorn

5 tlin 9 cyuc 5 kcak 0 tcan 2 dwat 6 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnykfrip hpa7tli flatprikwislip hpa7tmwatli xre7t hjonli

drutta *Crataegus schraderana* is a deciduous Tree growing to 6 m (19ft 8in). It is not frost tender. It is in flower in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Fruit - raw or cooked[74]. A reasonable size, about 15 - 20mm in diameter[K]. This is one of the nicest tasting fruits of the genus I have tried to date. When fully ripe it is juicy with an extremely pleasant flavour and almost literally melts in the mouth[K]. I would far rather eat this fruit than a strawberry[K]. It ripens in late September and hangs

on the tree in good condition for at least 4 weeks[K]. The fruit is so soft that it is best eaten fresh from the tree[K]. The fruit can also be used in making pies, preserves etc, and can be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta S. Europe - Greece. ksacta Mountainous areas[50].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. This species has an excellent potential as a fruit crop in Britain. The fruit is about the size of a cherry, it is very freely borne and the best forms are of excellent dessert quality[K]. The tree is very easily grown and is little troubled by pests or diseases. It also requires very little attention, once the trees are established virtually the only work needed is to harvest the fruit each year[K]. Grafted specimens can produce fruit in their third year[K]. A very ornamental plant[74], it grows well in Britain flowering and fruiting well at Kew and Wisley[K]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Hybridizes freely with other members of this genus[200]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

4.0.7 *Prunus insititia*

Damson

5 tlin 9 cyuc 5 kcak 3 tcan 1 dwat 6 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnykfrip hpa7tli flatprikwis hpa7tmwatli xre7t hjonli

drutta *Prunus insititia* is a deciduous Tree growing to 6 m (19ft) by 5 m (16ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5. It is in flower

in April, and the seeds ripen in October. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

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

kcakta Edible Parts: Fruit Seed Edible Uses: Fruit - raw or cooked [1, 2, 46]. More acid than a plum but it is very acceptable raw when fully ripe, especially after being touched by frost [12, 34, K]. The fruit is about 3cm in diameter and contains one large seed [200]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta Dye Hedge Hedge Shelterbelt A green dye can be obtained from the leaves [168]. A dark grey to green dye can be obtained from the fruit [168]. Trees are fairly wind resistant and can be grown as a shelterbelt hedge [200].

dwatta Febrifuge Purgative Styptic The bark of the root and branches is febrifuge and considerably styptic [4]. An infusion of the flowers has been used as a mild purgative for children [4]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being [238].

nrakta S. W. Asia. Naturalized and often considered a native of Britain. **ksacta** Thickets, hedges and open woods [4, 17].

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

nwatta Requires a well-drained moisture retentive soil [1, 11]. Succeeds in light shade but fruits better in a sunny position [11, 200]. Thrives in a loamy soil, doing well on limestone [11]. Grows well in heavy clay soils. Prefers some chalk in the soil but apt to become chlorotic if too much is present [1]. Occasionally cultivated for its edible fruit, there are some named varieties [200]. It has been derived in cultivation from the bullace, differing in having a sweeter fruit [200]. Damsons can be grown successfully against a north facing wall [219]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged [238]. Plants in this genus are notably susceptible to honey fungus [200]. *Prunus insititia* L. is a synonym of *Prunus domestica* subsp. *insititia* (L.) Bonnier and Layens For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2].

4.0.8 *Prunus domestica italica*

Gages, Greengage

5 tlin 8 cyuc 5 kcak 2 tcant 2 dwat 5 m hkuc

hmimhtut cyutli tcup hwicli hrasj lutnyikfrip hpa 7tli flatprikli-wisslip hpa 7tmwatli hjonli

Prunus domestica italica is a deciduous Tree growing to 5 m (16ft) by 4 m (13ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6. The flowers are pollinated by Bees, Insects. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

kcakta Edible Parts: Flowers Fruit Oil Seed Edible Uses: Oil Fruit - raw or cooked. Often considered to be the finest of the dessert plums, they have a delicious flavour [K]. The greengages. The usually green, globose fruit is usually 30 - 400mm in diameter. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity. An edible gum is obtained from points of damage on the trunk [64]. The seed contains about 20% of an edible semi-drying oil [4, 57]. It has an agreeable almond smell and flavour [4]. The flowers are eaten. They are used as a garnish for salads and ice cream or brewed into a tea [183].

tcanta Adhesive Cosmetic Dye Oil Wood A green dye can be obtained from the leaves [168]. A dark grey to green dye can be obtained from the fruit [168]. A yellow dye is obtained from the bark [115]. A gum obtained from points of damage along the stem can be used as an adhesive [64]. The ground up seeds are used cosmetically in the production of face-masks for dry skin [7]. A semi-drying oil is obtained from the seed [64]. No details of its uses. The reddish-brown wood is very close-grained, hard, compact. Liable to warp and split. It is used for musical instruments [115, 146].

dwatta Digestive Febrifuge Laxative Purgative Stomachic Styptic The dried fruit, known as prunes, is a safe and effective laxative and is also stomachic [4, 7, 21, 238]. The bark is sometimes used as a febrifuge and is styptic [4, 7]. An infusion of the flowers has been used as a mild purgative for children [4]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being [238].

nrakta A cultivated plant, not known in the wild. **ksacta** Not known in a truly wild situation

propta Seed - requires 2 - 3 months cold stratification and is best sown in a cold frame as soon as it is ripe [200]. Sow stored seed in a cold frame as early in the year as possible [200]. Protect the seed from mice etc. The seed can be rather slow, sometimes taking 18 months to germinate [113]. Prick out the seedlings into individual pots when they are large enough to handle. Grow them on in a greenhouse or cold frame for their first winter and plant them out in late spring or early summer of the following year. The various cultivars of plum are unlikely to breed true (though the green forms of the gage generally do) - they will usually produce a range of plants from seed with differing characteristics from their parent. Cuttings of half-ripe wood with a heel, mid summer in a frame [11, 200]. Softwood cuttings from strongly growing plants in spring to early summer in a frame [200]. Layering in spring.

nwatta The greengages are a group of cultivars of the common European plum. Gages are often cultivated as a fruit crop, especially in western Europe. Of excellent quality, though their delicate skins makes it difficult to get them to market in good condition and so they are more likely to be grown on a garden scale or be used for canning etc. *Prunus domestica* subsp. *italica* requires a well-drained moisture retentive soil [1, 11]. Succeeds in light shade but fruits better in a sunny position [11, 200]. Thrives in a loamy soil, doing well on limestone [11]. Grows well in heavy clay soils.

Prefers some chalk in the soil but apt to become chlorotic if too much is present [1]. The various gages are often cultivated for their edible fruits, especially on a garden scale. There are some named varieties [200]. The gage was first developed from the plum in the Middle East, later spreading via France into much of western Europe. Its cultivation has spread into most temperate regions, though it is often only grown on a small scale because of the difficulty of getting it to market in good condition. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged [238]. Plants in this genus are notably susceptible to honey fungus [200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is flat with shallow roots spreading near the soil surface [2-1]. *Prunus domestica italica* is a deciduous shrub or a tree usually growing 2 - 6 metres tall, occasionally to 15 metres. We can infer from its cultivation that the species grows optimally in areas with cold winters and long warm summers as vernalisation is required for flowering. The species can tolerate frost, however, when this occurs after flowering the fruit quality is poor (Lim 2002). Widely grown cultivars include: Boddarts Reneklode (Germany), Bryanston (UK), Cambridge Gage (UK), Cenerik (Turkey), Denniston's Superb (USA), Gojeh Sabz (Iran), Yasil Alça or Gøy Alça (Azerbaijan), Golden Transparent (UK), Graf Althanns Reneklode (Germany), Green Vanilla (Mount Pelion, Greece), Große Grüne Reneklode (Germany) / Reine Claude Verte (France), Laxton's Gage (UK), Laxton's Supreme (UK), Meroldts Reneklode (Germany), Rainha Cláudia (Portugal), Regina Claudia (Italy), Reine Claude de Bavay (France), Reine Claude d'Oullins (France), Uhinks Reneklode (Germany), Washington (USA).

4.0.9 Allium ampeloprasum

Wild Leek, Broadleaf wild leek
 5 tlin 9 cyuc 5 kcak 2 tcan 3 dwat 1.8 m hkuc
 htut cyutli kyuctcup hwicli hrasjlutnykfrp hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

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

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

kcakta Edible Parts: Flowers Leaves Root Edible Uses: Bulb - raw or cooked[2, 27, 61, 105]. The small bulbs can vary considerably in size from 2 - 6cm[200], they have a fairly strong leek to garlic flavour and are nice as a flavouring in cooked foods[K]. The bulbs of selected cultivars are very large with a mild garlic flavour[183]. Leaves - raw or cooked[2]. A pleasant mild to strong garlic flavour, they are available from late autumn to the spring though they can become rather tough and fibrous as they get older[K]. Flowers - raw. A similar flavour to the leaves but they have a somewhat dry texture and are best used as a flavouring in cooked foods[K]. The bulbils have a mild garlic flavour and make a nice flavouring in salads and cooked foods. Although produced abundantly, they are quite fiddly to use because they are small[K]. They can also be pickled[142].

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

dwatta Anthelmintic Antiasthmatic Anticholesterolemic Antiseptic Antispasmodic Cholagogue Diaphoretic Diuretic Expectorant Febrifuge Stimulant Stings Stomachic Tonic Vasodilator This species has the same medicinal virtues as garlic, but in a much milder and less effective form[238]. These

virtues are as follows:- Garlic has a very long folk history of use in a wide range of ailments, particularly ailments such as ringworm, Candida and vaginitis where its fungicidal, antiseptic, tonic and parasitidal properties have proved of benefit[218]. It is also said to have anticancer activity[218]. Daily use of garlic in the diet has been shown to have a very beneficial effect on the body, especially the blood system and the heart. For example, demographic studies suggest that garlic is responsible for the low incidence of arteriosclerosis in areas of Italy and Spain where consumption of the bulb is heavy[222]. The bulb is said to be anthelmintic, antiasthmatic, anticholesterolemic, antiseptic, antispasmodic, cholagogue, diaphoretic, diuretic, expectorant, febrifuge, stimulant, stomachic, tonic, vasodilator[4, 9, 14, 21, 46, 165]. The crushed bulb may be applied as a poultice to ease the pain of bites, stings etc[4, 9, 14, 21].

nrahta S. Europe to W. Asia. Possibly native in Britain in S.W. England and Wales[17]. ksacta Rocky places near the coast in S.W. England and Wales[17].

propta Seed - best sown as soon as it is ripe in a cold frame, though it can also be sown in a cold frame in the spring[200]. Prick out the seedlings into individual pots when they are large enough to handle. Well-grown plants can be planted out into their final positions in late summer or the autumn, otherwise grow them on for a further year in pots and plant them out the following summer. Division in late summer or early autumn. Dig up the bulbs when the plants are dormant and divide the small bulblets at the base of the larger bulb. Replant immediately, either in the open ground or in pots in a cold frame. Bulbils - plant out as soon as they are ripe in late summer. The bulbils can be planted direct into their permanent positions, though you get better results if you pot them up and plant them out the following spring.

nwatta Prefers a sunny position in a light well-drained soil[1]. Prefers a dry position[45]. Succeeds in clay soils[203]. Tolerates a pH in the range 5.2 to 8.3. The bulbs should be planted fairly deeply[1]. The wild leek is a rare native of Britain, found only in the south-west and Wales, though it should be hardy in most parts of the country. It comes into growth in the autumn, dying down in the summer, and makes a very pleasant winter leaf, either raw or cooked. It is a rather variable plant, especially in the amount of flowers and bulbils produced. The species produces mainly flowers with almost no bulbils, whilst the sub-species *A. ampeloprasum babbingtonii* (Babbington's Leek) produces lots of bulbils and almost no flowers[17]. The cultivated leek (*A. ampeloprasum porrum*) is believed to have been developed from this plant whilst, in Germany and Italy, other forms have been selected for their edible bulbils[142]. Allium ampeloprasum comprises several vegetables, of which the most important ones are: leek, elephant garlic or great-headed garlic, pearl onion, kurrat, Egyptian leek or salad leek, and Persian leek (*Allium ampeloprasum* ssp. *persicum*). The cultivar 'Perzweibel' is often used, the bulbils are solid rather than made up of layers and are popularly used for making pickles[183]. This cultivar does not set seed[183]. Another cultivated form of this plant produces very large, mild-garlic flavoured bulbs that are up to 500g in weight[183]. They are known as elephant garlic[183]. The wild leek grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. The plant growth habit is a clumper with limited spread [1-2]. The root pattern is a bulb.

4.0.10 Allium schoenoprasum

Chives, Wild chives, Flowering Onion
 5 tlin 11 cyuc 5 kcak 3 tcan 2 dwat 0.3 m hkuc
 hmimhtut cyutli tcup hwicli hrasjlutnykfrp hpa7tli flatprikli-wisslip hpa7tmwatli fyfxfre7t hjonli

drutta Allium schoenoprasum is a BULB growing to 0.3 m (1ft) by 0.3 m (1ft in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from February to December, in flower

from June to July, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, flies, Lepidoptera (Moths and Butterflies). The plant is self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

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

Edible Parts: Flowers Leaves Root
Edible Uses: Leaves - raw, cooked or dried for later use. The leaves have a mild onion flavour and are an excellent addition to mixed salads, they can also be used as a flavouring in soups etc[2, 4, 5, 9, 27, 33]. The leaves are often available from late winter and can continue to produce leaves until early the following winter, especially if they are in a warm, sheltered position[K]. A good source of sulphur and iron[201]. A nutritional analysis is available[218]. The bulbs are rather small, and rarely exceed 10mm in diameter[200]. They can be harvested with the leaves still attached and be used as spring onions[K]. They have a pleasant mild onion flavour. The flowers can be used as a garnish in salads etc[183]. The flowers of this species are rather dry and less desirable than the flowers of many other species[K].

Landscape Uses: Border, Container, Massing, Rock garden, Forest Garden. The juice of the plant is used as an insect repellent, it also has fungicidal properties and is effective against scab, mildew etc[14, 18, 20, 201]. The growing plant is said to repel insects and moles[14, 20, 200]. Dynamic accumulator. Ground cover.nectary, Ground Cover. Aromatic.

Digestive Hypotensive TonicThe whole plant has a beneficial effect on the digestive system and the blood circulation. It improves the appetite, is digestive, hypotensive and tonic[201]. It has similar properties to garlic (*A. sativum*), but in a much milder form, and it is rarely used medicinally[238].

Most of Europe, including Britain, east to the Himalayas and Japan. **Rocky pastures and damp meadows, preferring calcareous soils**[17, 90].

Seed - sow spring in a cold frame. Germination is usually free and easy, pot up the seedlings as soon as they are large enough to handle easily and plant out in the following spring. Division can be carried out at almost any time of the year but is probably best done in spring. The clumps should be divided at least every 3 or 4 years in order to maintain vigour[200], the divisions can be planted out direct into their permanent positions.

An easily grown plant[203], it prefers a sunny position in a rich moist but well-drained soil[14, 37], though it succeeds in most soils[1, 37, 200] and also in light shade[203]. Grows well in heavy clay soils[203]. Tolerates a pH in the range 5.2 to 8.3. Chives are commonly cultivated in the garden for their edible leaves which are available from late winter to the beginning of the following winter[K]. The bulbs divide rapidly and large clumps are quickly formed. There are some named varieties[183, 200, 203]. Chives are very tolerant of heavy harvesting, regular cutting of the leaves ensures a continuous supply of young leaves and prevents the plants flowering[33]. Plants can be moved into a frame or other protected environment in the autumn and will then produce leaves throughout the winter[33]. Do not do this every year or it weakens the plants. The bulbs should be planted fairly deeply[1]. A good bee plant[24]. Grows well with most plants, especially roses, carrots, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. Helps to reduce the incidence of scab when it is grown under apple trees[201]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233]. **Special Features:** North American native, Edible, Fragrant foliage, Invasive, Naturalizing, Attracts butterflies, Suitable for cut flowers, Suitable for dried flowers, Fragrant flowers. The plant is heat tolerant in zones 12 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants

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

4.0.11 *Sorbus torminalis*

Wild Service Tree, Checkertree

5 tlin 9 cyuc 4 kcaak 2 tcan 0 dwat 20 m hkcuc
hmimhtut cyutli tcup hwicli hrasjlutnykifrip hpa7tli flatprikli-
wis hpa7tmwatli xre7t hjonli

Sorbus torminalis is a deciduous Tree growing to 20 m (65ft 7in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

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.

Fruit Edible Uses: Fruit - raw or cooked[2, 5, 11, 74, 115, 183]. The taste is best after a frost because it turns sweeter. The fruit can also be bletted if it is going to be eaten raw[3, 183]. This involves storing the fruit in a cool dry place until it is almost but not quite going rotten. At this stage the fruit has a delicious taste, somewhat like a luscious tropical fruit. Rich in vitamin C. The fruit is up to 1.5cm across[200] and is borne in bunches which makes it easier to harvest[K].

Wood - heavy, fine grained, polishes well. Used for turning, wood carving[74, 115].

Europe, from Britain and Denmark south and east to N. Africa, the Caucasus and W. Asia. **Woods, usually on clay**[186], sometimes on limestone[17].

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.

Succeeds in most reasonably good soils so long as they are not too poor or acid, in an open sunny position[1, 11]. Prefers clay soils[3, 11]. Tolerates moderate shade[188], but does not fruit so well in such a position[K]. Grows best in the eastern half of Britain[121]. Plants are susceptible to fireblight[188]. Plants respond well to coppicing[186]. When found in a truly wild situation this species is considered to be an indication of primary woodland[200]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.0.12 Acer saccharum grandidentatum

Big-Tooth Maple, Canyon Maple, Rocky Mountain Sugar Maple

5 tlin 8 cyuc 4 kcak 0 tcan 0 dwat 12 m hkuc
hmimhtut cyutli tcup hwicli hrasj|lutnyikfrp hpa7tli flatprikli-
wis hpa7tmwatli hjonli

drutta Acer saccharum grandidentatum is a deciduous Tree growing to 12 m (39ft) by 8 m (26ft). See above for USDA hardiness. It is hardy to UK zone 3. It is in flower from April to May, and the seeds ripen in September. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Inner bark Sap SeedEdible Uses: SweetenerThe sap is relatively rich in sugar and can be made into a drink or concentrated into a syrup by boiling off the water[1, 2, 11, 34, 57]. The syrup is used as a sweetener on many foods. It can be harvested in late winter or early spring[[142], the flow is best on a warm sunny day after a frost. Trees on southern slopes in sandy soils give the best yields. It is best to make a hole about 7cm deep and about 1.3 metres above the ground[171]. Yields of 40 - 100 litres per tree can be obtained[142]. The best sap production comes from cold-winter areas with continental climates. Seed - boiled then roasted[62, 105, 159]. The seed is about 6mm long and is produced in small clusters[82]. Inner bark cooked. It is dried, ground into a powder and then used as a thickening in soups etc or mixed with cereals when making bread[105, 161].

tcanta Fuel Preservative WoodThe leaves are packed around apples, rootcrops etc to help preserve them[18, 20]. Wood - close grained, tough, hard, heavy. Used for furniture, ship building, etc[46, 61, 82, 171]. It is a good fuel.

nrakta Western N. America - Rocky Mountains. ksakta Found in moist sites such as wet canyons, valleys and the banks of mountain streams at elevations of 1200 - 2100 metres[229].

propta Seed - best sown as soon as it is ripe in a cold frame, it usually germinates in the following spring. A lot of the seed is non-viable, it is best to cut a few open to see if there is an embryo[113]. An average of 95% germination can be achieved from viable seed[98]. Pre-soak stored seed for 24 hours and then stratify for 2 - 4 months at 1 - 8°C. It can be slow to germinate, sometimes taking two years[125]. The seed can be harvested 'green' (when it has fully developed but before it has dried and produced any germination inhibitors) and sown immediately. It should germinate in late winter. If the seed is harvested too soon it will produce very weak plants or no plants at all[80, 113]. When large enough to handle, prick the seedlings out into individual pots and grow them on until they are 20cm or more tall before planting them out in their permanent positions. Layering, which takes about 12 months, is successful with most species in this genus. Cuttings of young shoots in June or July. The cuttings should have 2 - 3 pairs of leaves, plus one pair of buds at the base. Remove a very thin slice of bark at the base of the cutting, rooting is improved if a rooting hormone is used. The rooted cuttings must show new growth during the summer before being potted up otherwise they are unlikely to survive the winter.

nwatta Landscape Uses:Firewood, Pest tolerant, Specimen, Street tree. Of easy cultivation, it prefers a good moist well-drained soil but succeeds on most soils[11, 98]. Chlorosis can often develop as a result of iron deficiency when the plants are grown in alkaline soils. Grows well in heavy clay soils. Trees need full light and a lot of space if they are to grow well[98]. Plants are hardy to about -45°C when fully dormant[160]. This species is not a great success in Britain[1], though it does better than once thought[11]. It grows well in Cornwall[59]. Slow growing when young[11]. Plants produce prodigious root growth but very little top growth in first year from seed[133]. A very ornamental tree[1] but a bad companion plant, inhibiting the growth of nearby plants[18, 20]. This species is commercially exploited in America for its sap[1, 11]. Along with *A. saccharum* and the sub-species *A. s. nigrum* it is the major source of maple syrup[11]. There are some named varieties[183]. The sap

can be tapped within 10 - 15 years from seed but it does not flow so well in areas with mild winters[160]. Special Features:North American native, Inconspicuous flowers or blooms.

4.0.13 Crataegus azarolus

Azarole

5 tlin 9 cyuc 4 kcak 0 tcan 2 dwat 10 m hkuc
hmimhtut cyutli hgattcuphja7n hwicli hrasj|lutnyikfrp hpa7tli
flatprikliwis hpa7tmwatli xre7t hjonli

drutta Crataegus azarolus is a deciduous Tree growing to 10 m (32ft 10in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in June. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked in pies, preserves etc[1, 2, 3, 11, 34, 183]. The fruit can be used fresh or dried for later use. A pleasant acid taste[89]. In warm temperate areas the fruit develops more fruit sugars and has a fragrant sugary pulp with a slightly acid flavour[183]. It can be eaten out of hand. In cooler zones, however, the fruit does not develop so well and is best cooked or used in preserves[183]. The fruit is very variable in size and colour, it is up to 25mm in diameter[200]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta S. Europe to W. Asia. ksakta Dry hillsides and mountains in woods and hedges[50].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate

atmospheric pollution[200]. The azarole has long been cultivated for its edible fruit in S. Europe, though it is now going out of favour[3, 11]. There are some named varieties[46]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Hawthorns in general hybridize freely with other members of the genus[200]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

4.0.14 *Crataegus pinnatifida major*

Chinese Haw

5 tlin 9 cyuc 4 kcak 2 tcan 3 dwat m hkuc
hmimhtut cyutli hgattcuph7a7n hwicli hrasjlutnyikfrip hpa7tli flatprikhlwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus pinnatifida major* is a deciduous Tree growing to 7.5 m (24ft 7in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[3, 105, 177]. A pleasant flavour, it is sold in local markets in China[178]. The fruit can be used in making pies, preserves, etc, and can also be dried for later use. A good size, it is up to 25mm in diameter[200]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Anticholesterolemic Cardiotonic Hypotensive Stomachic Vasodilator The fruits and flowers of hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222]. The fruits are anticholesterolemic, cardiotonic, stomachic and vasodilator. Their use improves the blood circulation and lowers blood pressure[176]. The fruits are used in the treatment of dyspepsia, stagnation of fatty foods, abdominal fullness, retention of lochia, amenorrhoea, postpartum abdominal pain, hypertension and coronary heart disease[176].

nrakta E. Asia - China. ksacta Riverbanks, on sandy soils or stony slopes[74].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but

undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. A very ornamental plant, this sub-species is widely cultivated for its edible fruit in China[266], it is larger than the type species[46, 178, 200].

4.0.15 *Pyrus pyrifolia culta*

Asian Pear

5 tlin 9 cyuc 4 kcak 0 tcan 1 dwat 10 m hkuc
hmimhtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flatprikhlwiss hpa7tmwatli xre7t hjonli

drutta *Pyrus pyrifolia culta* is a deciduous Tree growing to 10 m (32ft 10in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in April. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[2, 105]. Crisp, juicy with a fine flavour[178]. The fruit contains about 6 - 9.5% sugar and up to 0.56% fruit acids[179].

dwatta Antiseptic Astringent Febrifuge Nervine Pectoral Antiseptic, astringent, febrifuge, nervine, pectoral[178].

nrakta A cultivated form of *P. pyrifolia*. ksacta Not known in the wild.

propta Seed - best sown in a cold frame as soon as it is ripe in the autumn, it will then usually germinate in mid to late winter. Stored seed requires 8 - 10 weeks cold stratification at 1°C and should be sown as early in the year as possible[200]. Temperatures over 15 - 20°C induce a secondary dormancy in the seed[200]. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in light shade in a cold frame or greenhouse for their first year. Plant them out in late spring or early summer of the following year. The seed of pear cultivars will not usually breed true to type.

nwatta Prefers a good well-drained loam in full sun[200]. Grows well in heavy clay soils. Tolerates light shade but does not fruit so well in such a position. Tolerates atmospheric pollution, excessive moisture and a range of soil types if they are moderately fertile[200]. Established plants are drought tolerant[200]. Plants are hardy to at least -15°C[200]. Cultivated for its edible fruit in China and Japan, there are many named varieties[183]. A hybrid between this plant and *P. communis culta* is more suitable for warmer climates[11].

4.0.16 *Pyrus pyrifolia*

Sand Pear, Chinese pear

5 tlin 9 cyuc 4 kcak 0 tcan 1 dwat 10 m hkuc
hmimhtut cyutli hgattcup hwicli hrasjlutnyikfrip hpa7tli flatprikhlwiss hpa7tmwatli xre7t hjonli

drutta *Pyrus pyrifolia* is a deciduous Tree growing to 10 m (32ft 10in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in April, and

the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil and can tolerate drought. It can tolerate atmospheric pollution.

ksakta Edible Parts: Fruit **Edible Uses:** Fruit - raw or cooked. Hard and gritty[11]. Firm crisp and juicy when fully ripe, they are eaten out of hand or used in fruit salads, pies or baked etc[183]. The fruit is up to 3cm long[200]. Up to 5cm in another report[194]. The average yield from wild trees in the Himalayas is 83kg per year, though some trees yield up to 200kg[194]. The fruit contains about 4.9% sugars, 3.2% protein, 0.9% pectin[194].

dwatta Antiseptic Astringent Febrifuge Nervine **Pectoral Antiseptic, astringent, febrifuge, nervine, pectoral**[178].

nrakta E. Asia - China. **ksakta** Warm rainy regions at elevations of 100 - 1400 metres in China[266]. Naturalized in low mountains and around villages in C. and S. Japan[58].

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

nwatta Prefers a good well-drained loam in full sun[200]. Grows well in heavy clay soils. Tolerates light shade but does not fruit so well in such a position. Tolerates atmospheric pollution, excessive moisture and a range of soil types if they are moderately fertile[200]. Established plants are drought tolerant[200]. Plants are hardy to at least -15°C[200]. A parent of the cultivated Asian pears[11]. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that work together for their optimal soil requirements including nutrients and water. The root pattern is branching: a heart root, dividing from the crown into several primary roots going down and out [2-1].

4.0.17 *Cornus officinalis*

Shan Zhu Yu, Asiatic dogwood, Japanese Cornel Dogwood

5 tlin 8 cyuc 4 kcaak 0 tcan 3 dwat 10 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

drutta *Cornus officinalis* is a deciduous Shrub growing to 10 m (32ft) by 10 m (32ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from February to March, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

ksakta Edible Parts: Fruit **Edible Uses:** Fruit - raw or cooked[105, 177]. The fully ripe fruit is quite pleasant but slightly astringent[K]. It is about 1.5cm long[200]. The fruit contains about 8.6% sugars, 2.9% malic acid, 0.74% ash[179].

dwatta Antibacterial Antifungal Antiperiodic Antiseptic Antitumor Astringent Diuretic Hepatic Hypotensive Malaria Tonic Urinary **Shan Zhu Yu** has been used for at least 2,000 years in Chinese herbal medicine. It is a herb that "stabilizes and binds" and is used principally to reduce heavy menstrual bleeding and unusually active secretions including copious sweating, excessive urine, spermatorrhoea and premature ejaculation[147, 238, 254]. Like all herbs that suppress bodily fluids (even excessive ones), it will simply prolong or lead to a worsening of symptoms if it is used without tonic or detoxifying herbs[254]. It is, therefore, normally used in combination with herbs such as *Rehmannia glutinosa* and is an ingredient of the "Pill of eight ingredients" which is

used in China to "warm up and invigorate the yang of the loins"[254]. The fruit is antibacterial, antifungal, hypotensive, antitumor, astringent, diuretic, hepatic and tonic[116, 147, 176, 178, 238]. The fruit, without the seed, is decocted for the treatment of arthritis, fever and a wide range of other ailments[218, 279]. It is used in the treatment of senile lumbago, diabetes, cystitis, tinnitus etc[174, 254, 279]. The fruit has an antibacterial action, inhibiting the growth of *Bacillus dysenteriae* and *Staphylococcus*[176]. The fruit is harvested when fully ripe and is dried for later use[238]. The stem bark is astringent, antimalarial and tonic[218]. The plant is antibacterial, diuretic, hypotensive and a urinary antiseptic[218].

nrakta E. Asia - China, Japan, Korea. **ksakta** Woodland, 1200 - 1800 metres in W. China[109]. Mountains, slopes, forest margins and forests at elevations of 400 - 1500, occasionally to 2100 metres[266].

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

nwatta **Landscape Uses:** Border, Massing, Standard, Specimen, Street tree. An easily grown plant, it succeeds in any soil of good or moderate fertility[1], ranging from acid to shallow chalk[200]. Grows well in heavy clay soils. Succeeds in full sun or light shade[[188]. A very ornamental plant[1], it is very closely related to *C. mas*[1, 11] but is more tree-like in its habit[K]. Plants in this genus are notably resistant to honey fungus[200]. **Special Features:** Attractive flowers or blooms.

4.0.18 *Prunus cerasifera*

Cherry Plum, Myrobalan Plum, Newport Cherry Plum, Pissard Plum

5 tlin 8 cyuc 4 kcaak 3 tcan 1 dwat 9 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikli-wis hpa7tmwatli xre7t hjonli

drutta *Prunus cerasifera* is a deciduous Tree growing to 9 m (29ft) by 9 m (29ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 4. It is in flower in March, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure.

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

ksakta Edible Parts: Fruit **Seed Edible Uses:** Fruit - raw or cooked in pies, tarts, jams etc[2, 5, 12, 34, 183]. The size of a small plum with a thin skin and a nice sweet flavour[183]. The flesh is somewhat mealy but is also juicy[K]. The fruit can hang on the tree until October[K]. The fruit is about 30mm in diameter and contains one large seed[200]. Seed - raw or

do not eat the seed if it is too bitter - see the notes above on toxicity.

tcanta Dye Hedge Hedge Rootstock ShelterbeltA green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Makes quite a good windbreak hedge though it cannot stand too much exposure[1, 11, 29]. Often used as a rootstock for the cultivated plums, giving them a semi-dwarfing habit[61].

dwatta BachThe plant is used in Bach flower remedies - the keywords for prescribing it are 'Desperation', 'Fear of losing control of the mind' and 'Dread of doing some frightful thing'[209]. It is also one of the five ingredients in the 'Rescue remedy'[209]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta W. Asia? Original habitat is obscure. Often planted in hedgerows in Britain but rarely naturalized. **ksacta** Not known in a truly wild situation.

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

nwatta Landscape Uses:Specimen. Requires a well-drained moisture retentive soil[1, 11]. Succeeds in light shade but fruits better in a sunny position[11, 200]. Thrives in a loamy soil, doing well on limestone[11]. Grows well in heavy clay soils. Prefers some chalk in the soil but apt to become chlorotic if too much is present[1]. A very ornamental plant[1], it is sometimes cultivated for its edible fruit, unfortunately this is not often borne in large quantities in Britain[3, 17], but large crops are produced every 4 years or so[K]. There are some named varieties[183]. Included as a part of *P. divaricata* by some botanists[11] though others include *P. divaricata* as a sub-species under this species[200]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. Plants in this genus are notably susceptible to honey fungus[200]. **Special Features:**Attractive foliage, Not North American native, All or parts of this plant are poisonous, Blooms are very showy. The plant is heat tolerant in zones 9 through 1. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.) For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. A sprouting standard sending up shoots from the base [1-2].

4.0.19 Sambucus nigra

Elderberry - European Elder, Black elderberry, American black elderberry, Blue elderberry, *Europea*
5 tlin 7 cyuc 4 kcak 5 tcan 3 dwat 6 m hkuc
hmmihmtut cyutli tcup hwicli hrasljutnyikfrip hpa7tli flatprikli-wisslip hpa7tmwatli xre7t hjonli

drutta Sambucus nigra is a deciduous Shrub growing to 6 m (19ft) by 6 m (19ft) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5 and is not frost tender. It is in leaf from March to November, in flower from June to July, and the seeds ripen from August to September. The

species is hermaphrodite (has both male and female organs) and is pollinated by Flies. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure. It can tolerate atmospheric pollution.

pcista The leaves and stems are poisonous[9, 76]. The fruit of many species (although no records have been seen for this species) has been known to cause stomach upsets to some people. Any toxin the fruit might contain is liable to be of very low toxicity and is destroyed when the fruit is cooked[65, 76].

ksakta Edible Parts: Flowers FruitEdible Uses: Colouring TeaFruit - raw or cooked[2, 3, 5, 46, 61]. The flavour of the raw fruit is not acceptable to many tastes, though when cooked it makes delicious jams, preserves, pies and so forth[K]. It can be used fresh or dried, the dried fruit being less bitter[12, 183, 238]. The fruit is used to add flavour and colour to preserves, jams, pies, sauces, chutneys etc, it is also often used to make wine[13, 183]. The fruit is about 8mm in diameter and is borne in large clusters[200]. Some caution is advised, see the notes above on toxicity. **Flowers** - raw or cooked[2, 5, 12, 53]. They can also be dried for later use[21]. The flowers are crisp and somewhat juicy, they have an aromatic smell and flavour and are delicious raw as a refreshing snack on a summers day, though look out for the insects[K]. The flowers are used to add a muscatel flavour to stewed fruits, jellies and jams (especially gooseberry jam)[238]. They are often used to make a sparkling wine[183]. A sweet tea is made from the dried flowers[21, 183]. The leaves are used to impart a green colouring to oils and fats[183].

tcanta Compost Cosmetic Dye Fungicide Hedge Hedge Insecticide Litmus Microscope Musical Pioneer Pipes Repellent WoodThe plant is a valuable addition to the compost heap[14, 18], its flowers are an alternative ingredient of 'QR' herbal compost activator[32] and the roots of the plant improve fermentation of the compost heap when growing nearby[18]. The leaves are used as an insect repellent[4, 6, 14, 66], very effective when rubbed on the skin though they do impart their own unique fragrance[K]. They can be powdered and placed amongst plants to act as a deterrent[14], or made into a spray when they act as an insecticide[7]. This is prepared by boiling 3 - 4 handfuls of leaves in a litre of water, then straining and allowing to cool before applying[201]. Effective against many insects, it also treats various fungal infections such as leaf rot and powdery mildew[201]. The dried flowering shoots are used to repel insects, rodents etc[101]. The flowers are used in skin lotions, oils and ointments[238]. Tolerant of salt-laden gales, this species can be grown as a shelter hedge in exposed maritime areas[29, 75], it is rather bare in the winter though[K]. This is an excellent pioneer species to use when re-establishing woodlands. It is very tough and wind-resistant, grows quickly and provides shelter for longer-lived and taller woodland species to establish. It will generally maintain itself in the developing woodland, though usually in the sunnier positions[K]. A dye is obtained from the fruit and the bark[13, 15]. The bark of older branches and the root have been used as an ingredient in dyeing black[4]. A green dye is obtained from the leaves when alum is used as a mordant[4]. The berries yield various shades of blue and purple dyes[4]. They have also been used as a hair dye, turning the hair black[4]. The blue colouring matter from the fruit can be used as a litmus to test if something is acid or alkaline. It turns green in an alkaline solution and red in an acid solution[4]. The pith in the stems of young branches pushes out easily and the hollow stems thus made have been used as pipes for blowing air into a fire[4]. They can also be made into musical instruments[4]. The pith of the wood is used for making microscope slides and also for treating burns and scalds[46, 61, 100]. The mature wood is white and fine-grained. It is easily cut and polishes well[4]. Valued highly by carpenters, it has many uses, for making skewers, mathematical instruments, toys etc[4, 13, 100, 244]. A good forage for animals: mule deer, elk, sheep and small birds. It is classified as nesting habitat for many birds, including hummingbirds, warblers, and vireos. Elderberries are a favorite food for migrating band-tailed pigeons in northern California.

dwatta Antiinflammatory Aperient Diaphoretic Diuretic

Emollient Expectorant Galactogogue Haemostatic Laxative Ophthalmic Purgative Salve Stimulant Elder has a very long history of household use as a medicinal herb and is also much used by herbalists[4]. The plant has been called 'the medicine chest of country people'[4]. The flowers are the main part used in modern herbalism, though all parts of the plant have been used at times[238]. Stimulant[9, 53, 165]. The inner bark is collected from young trees in the autumn and is best sun-dried[4]. It is diuretic, a strong purgative and in large doses emetic[4, 7]. It is used in the treatment of constipation and arthritic conditions[238]. An emollient ointment is made from the green inner bark[4]. The leaves can be used both fresh or dry. For drying, they are harvested in periods of fine weather during June and July. The leaves are purgative, but are more nauseous than the bark[4]. They are also diaphoretic, diuretic, expectorant and haemostatic[4, 7]. The juice is said to be a good treatment for inflamed eyes[4]. An ointment made from the leaves is emollient and is used in the treatment of bruises, sprains, chilblains, wounds etc[4]. The fresh flowers are used in the distillation of 'Elder Flower Water'. The flowers can be preserved with salt to make them available for distillation later in the season[4]. The water is mildly astringent and a gentle stimulant. It is mainly used as a vehicle for eye and skin lotions[4]. The dried flowers are diaphoretic, diuretic, expectorant, galactogogue and pectoral[4, 7]. An infusion is very effective in the treatment of chest complaints and is also used to bathe inflamed eyes[4]. The infusion is also a very good spring tonic and blood cleanser[4]. Externally, the flowers are used in poultices to ease pain and abate inflammation[4]. Used as an ointment, it treats chilblains, burns, wounds, scalds etc[4]. The fruit is depurative, weakly diaphoretic and gently laxative[4, 7]. A tea made from the dried berries is said to be a good remedy for colic and diarrhoea[4]. The fruit is widely used for making wines, preserves etc., and these are said to retain the medicinal properties of the fruit[4]. The pith of young stems is used in treating burns and scalds[46, 61, 100]. The root is no longer used in herbal medicine but it formerly had a high reputation as an emetic and purgative that was very effective against dropsy[4]. A homeopathic remedy is made from the fresh inner bark of young branches[4]. It relieves asthmatic symptoms and spurious croup in children[4]. The German Commission E Monographs, a therapeutic guide to herbal medicine, approve *Sambucus nigra* for cough and bronchitis, fevers and colds (see [302] for critics of commission E).

nrakta Europe, including Britain, from Scandinavia south and east to N. Africa and W. Asia. ksacta Hedgerows, scrub, woods, roadsides, waste places etc, especially on disturbed base-rich and nitrogen rich soils[9, 17].

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

nwatta Industrial Crop: Dye Industrial Crop: Medicinal Management: Standard Minor Global Crop Landscape Uses: Border, Container, Massing, Pollard, Standard, Seashore, Specimen. A very easily grown plant, it tolerates most soils and situations[11, 28, 98], growing well on chalk[28, 98, 186], but prefers a moist loamy soil[200]. Grows well in heavy clay soils. Tolerates some shade but fruits better in a sunny position[37, 200]. Tolerates atmospheric pollution and coastal situations[200]. Another report says that it is intolerant of very smoky atmospheres[186]. The elder is very occasionally cultivated for its edible fruit, there are some named varieties though most of these have been developed for their ornamental value[182]. The subspecies *S. nigra alba* has white/green fruits that are nicer than the type species and are quite nice raw[K]. The elder also has a very long history of folk use, both medicinally and

for a wide range of other uses. All in all it is a very valuable plant to have in the garden. The leaves often begin to open as early as January and are fully open in April[186]. The leaves fall in October/November in exposed sites, later in sheltered positions[186]. Young stems can be killed by late frosts but they are soon replaced from the ground level[186]. Very tolerant of pruning, plants can be cut back to ground level and will regrow from the base[186]. The flowers have a sweet, almost overpowering smell, not exactly pleasant when inhaled near to for it has fishy undertones, but from a distance its musky scent is appealing[245]. Very resistant to the predations of rabbits[17, 186]. The flowers are very attractive to insects[186]. The fruit is very attractive to birds[186] and this can draw them away from other cultivated fruits[14, 186]. The elder is an early colonizer of derelict land, the seed arriving in the defecations of birds and mammals[186]. It is a very good pioneer species for re-establishing woodlands. Plants in this genus are notably resistant to honey fungus[200]. Special Features: Attractive foliage, Not North American native, Attractive flowers or blooms. In garden design, as well as the above-ground architecture of a plant, root structure considerations help in choosing plants that 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].

4.0.20 *Crataegus laciniata*

5 tlin 9 cyuc 4 kcaok 0 tcan 2 dwat 6 m hkuc hmimhtut cytuli hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli flatprikklwisslip hpa7tmwatli xre7t hjonli

drutta *Crataegus laciniata* is a deciduous Tree growing to 6 m (19ft) by 6 m (19ft). See above for USDA hardness. It is hardy to UK zone 6 and is not frost tender. It is in flower in June, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcaakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked[2, 105]. A pleasant acid taste[74]. The fruit is about 1.5cm in diameter[200]. A nice taste with a very good flesh to seed ratio, it can be eaten in quantity for dessert[K]. The fruit can be used in making pies, preserves, etc, and can also be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta WoodWood - heavy, close-grained, hard and tough. Used for tool handles etc[82, 74].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta E. Asia. Occasionally self-sows in Britain[17]. ksacta Mountain thickets and rocky slopes[50].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to

put up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. A very hardy species, tolerating temperatures down to at least -18°C[202]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

4.0.21 *Crataegus champlainensis*

Quebec hawthorn

5 tlin 9 cyuc 4 kcaak 0 tcan 2 dwat 6 m hkuc

hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

drutta *Crataegus champlainensis* is a deciduous Tree growing to 6 m (19ft 8in). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked. A nice sweet flavour, the fruit is about 1.5cm in diameter[K]. The fruit can be used in making pies, preserves, etc, and can also be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Northern N. America - Quebec to New York and Ontario. ksacta Thickets, streambanks and hillsides[204]. Limestone ridges[82].

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a

cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. Closely related to *C. submollis*[200], and included in that species by some botanists[82]. This species is possibly no more than a part of *C. rotundifolia*[204].

4.0.22 *Berberis aristata*

Chitra, Indian Barberry or Tree Turmeric

5 tlin 9 cyuc 4 kcaak 3 tcan 3 dwat 3.5 m hkuc

hmimhtut cyutli kyuctcup hwicli hyishrasjlutnyikfrip hpa7tli flatprikliwis hpa7tmwatli fyifxre7t hjonli

drutta *Berberis aristata* is an evergreen Shrub growing to 3.5 m (11ft 6in) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in leaf all year, in flower in May. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

kcakta Edible Parts: Flowers FruitEdible Uses: Fruit - raw or cooked[145]. A well-flavoured fruit, it has a sweet taste with a blend of acid, though there is a slight bitterness caused by the seeds[194, K]. The fruit is much liked by children[194, K]. It is dried and used like raisins in India[2, 3, 177, 183]. The fruit contains about 2.3% protein, 12% sugars, 2% ash, 0.6% tannin, 0.4% pectin[194]. There is 4.6mg vitamin C per 100ml of juice[194]. The fruit is about 7mm x 4mm [194] - it can be up to 10mm long[200]. Plants in the wild yield about 650g of fruit in 4 pickings[194]. Flower buds - added to sauces[177, 183].

tcanta Dye Fuel TanninA yellow dye is obtained from the root and the stem[46, 61, 272]. An important source of dyestuff and tannin, it is perhaps one of the best tannin dyes available in India[194]. The wood is used as a fuel[146]. The spiny branches are used for making fencing around fields[272].

dwatta Alternative Antibacterial Antiperiodic Bitter Cancer Deobstruent Diaphoretic Dysentery Laxative Malaria Ophthalmic Tonic Vitamin CThe dried stem, root bark and wood are alternative, antiperiodic, deobstruent, diaphoretic, laxative, ophthalmic and tonic (bitter)[46, 61, 158, 194, 240]. An infusion is used in the treatment of malaria, eye complaints, skin diseases, menorrhagia, diarrhoea and jaundice[240, 243]. Berberine, universally present in rhizomes of *Berberis* species, has marked antibacterial effects. Since it is not appreciably absorbed by the body, it is used orally in the treatment of various enteric infections, especially bacterial dysentery[218]. It should not be used with Glycyrrhiza species (Liquorice) because this nullifies the effects of the

berberine[218]. Berberine also shown antitumour activity[218].

nrakta E. Asia - Himalayas in Nepal. ksacta Shrubberies to 3500 metres[51]. Open hillsides at elevations of 1800 - 3000 metres[272].

propta Seed - best sown as soon as it is ripe in a cold frame, it should germinate in late winter or early spring[78]. Seed from over-ripe fruit will take longer to germinate[78]. Stored seed may require cold stratification and should be sown in a cold frame as early in the year as possible[80]. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse or cold frame for at least their first winter. Once they are at least 20cm tall, plant them out into their permanent positions in late spring or early summer, after the last expected frosts. The seedlings are subject to damping off, so be careful not to overwater them and keep them well ventilated[113]. Cuttings of half-ripe wood, July/August in a frame. Very difficult, if not impossible. Cuttings of mature wood of the current season's growth, preferably with a heel, October/November in a frame[78]. Very difficult, if not impossible.

nwatta Prefers a warm moist loamy soil and light shade but it is by no means fastidious, succeeding in thin, dry and shallow soils[11, 200]. Grows well in heavy clay soils. Plants are very hardy, they survived the severe winters of 1986-1987 without problems in most areas of Britain[K]. Plants can be pruned back quite severely and resprout well from the base[200]. The fruits are sometimes sold in local markets in India[194]. Hybridizes freely with other members of this genus[1]. Most plants cultivated under this name are *B. chitria.*, *B. coriaria.*, *B. glaucocarpa.* and, more commonly, *B. floribunda*[67, 200].

4.0.23 Fagopyrum spp.

Perennial Buckwheat

5 tlin 10 cyuc 4 kca2 0 tcan 2 dwat 1 m hkuc
hmimhtut cyutli tcup hwicli hyishrasljutnyikfrip hpa7tli flat-prikwis hpa7tmwatli hjonli

druata Fagopyrum spp. is a PERENNIAL growing to 1 m (3ft 3in) by 1 m (3ft 3in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 5. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcka2a Edible Parts: Leaves SeedEdible Uses: Leaves - raw or cooked[105, 160, 272]. Boiled or steamed and used like spinach[183]. Of excellent quality according to one report[2], but we have been less than impressed by the flavour, which has a distinct bitterness especially when eaten raw[K]. The leaves are rich in rutin (see below for details of its uses) and so they do make a healthy addition to the diet[K]. Seed - it can be sprouted and eaten raw, or cooked and used as a cereal[4]. Dried and ground into a powder, it can serve as a thickening agent in soups etc. The seed is rich in vitamin B6. Unfortunately, it is not freely produced in Britain[2]. Carbon Farming Solutions - Staple Crop: balanced carb (The term staple crop typically refers to a food that is eaten routinely and accounts for a dominant part of people's diets in a particular region of the world) [1-1].

tcanta Animal feed, An ornamental plant.

dwatta The whole plant is anodyne, anthelmintic, antiplogistic, carminative, depurative and febrifuge. It stimulates blood circulation[147]. A decoction is used in the treatment of traumatic injuries, lumbago, menstrual irregularities, purulent infections, snake and insect bites[147]. A decoction of the roots is used in the treatment of insect bites, dysmenorrhoea, inflammation, lumbago, snakebite and traumatic injuries[218]. The leaves are rich in rutin which is a capillary tonic, antioedemic, anti-inflammatory, antispasmodic and hypotensive[218]. Rutin also inhibits carcinogenesis and protects against radiation[218].

nrakta Eurasia. ksacta Forests and cultivated areas from Pakistan to S.W. China, 1500 - 3400 metres[51]. Found alongside ditches on shady damp and fertile soils in China[147].

propta Seed - sow spring in a greenhouse. Prick out the seedlings when they are large enough to handle and plant

them out into their permanent positions in the summer. Division is very easy at almost any time in the growing season, though it is best avoided in early spring because the young growth can be damaged by late frosts. The divisions can be planted out direct into their permanent positions.

nwatta Hypothetical Crop Management: Standard Staple Crop: Balanced carbClimate: boreal to cold temperate. Humidity: arid to semi-arid. Carbon Farming Solutions - Cultivation: hypothetical - F. esculentum could be crossed with *F. cymosum*. Management: standard (Describes the non-destructive management systems that are used in cultivation) [1-1].

4.0.24 Allium porrum

Leek, Garden leek

5 tlin 9 cyuc 4 kca2 0 tcan 2 dwat 0.9 m hkuc
htut cyutli tcup hwicli hrasljutnyikfrip hpa7tli flatprikwislijp hpa7tmwatli xre7t hjonli

druata Allium porrum is a BULB growing to 0.9 m (3ft). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects. Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers moist soil.

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

kcka2a Edible Parts: Flowers Leaves RootEdible Uses: The leaves and long white blanched stem are eaten cooked[2, 16, 37, 183]. They can also be cut into thin slices and be added to salads[183]. A mild onion flavour with a delightful sweetness[183, K]. Bulb - raw or cooked. The bulb is produced in the plants second year of growth (that is, after it is normally harvested). The bulb is somewhat larger if the plant is prevented from flowering[K]. Flowers - raw. Used as a garnish on salads, though they are rather on the dry side and less pleasant than many other members of the genus[K].

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

dwatta Anthelmintic Antiasthmatic Anticholesterolemic Antiseptic Antispasmodic Chologogue Diaphoretic Diuretic Expectorant Febrifuge Stimulant Stings Stomachic Tonic VasodilatorThis species has the same medicinal virtues as garlic, but in a much milder and less effective form[238]. These virtues are as follows:- Garlic has a very long folk history of use in a wide range of ailments, particularly ailments such as ringworm, Candida and vaginitis where its fungicidal, antiseptic, tonic and parasitocidal properties have proved of benefit[218]. It is also said to have anticancer activity[218]. Daily use of garlic in the diet has been shown to have a very beneficial effect on the body, especially the blood system and the heart. For example, demographic studies suggest that garlic is responsible for the low incidence of arteriosclerosis in areas of Italy and Spain where consumption of the bulb is heavy[222]. The bulb is said to be anthelmintic, antiasthmatic, anticholesterolemic, antiseptic, antispasmodic, chologogue, diaphoretic, diuretic, expectorant, febrifuge, stimulant, stomachic, tonic, vasodilator[4, 9, 14, 21, 46, 165]. The crushed bulb may be applied as a poultice to ease the pain of bites, stings etc[4, 9, 14, 21].

nrakta Original habitat is obscure. ksacta Not known in wild.

propta Seed - for an early crop, or for larger plants, sow the seed in early spring in a greenhouse and plant out in May. For smaller or later plants, sow April in an outdoor seedbed and plant out as space permits in July or even August.

nwatta Prefers a sunny position in a light well-drained soil[1] but succeeds in most soils[16]. Grows well in heavy clay soils. Prefers an open situation[1, 37]. Does best in a soil that was well fed for a previous crop[1]. Tolerates a pH in the range 5.2 to 8.3. The leek is a widely cultivated vegetable, there are many named varieties[183]. Young plants are often planted quite deeply in the soil (8 - 10cm deep) in order to blanch the lower stem, it is also a common practice

earth up the growing plants in order to blanch right the way up the stems. Whilst this does make the stems more tender, it also results in a loss of minerals and vitamins. Although commonly treated as a biennial, this plant is a true perennial, perennating by means of small lateral growths and often developing a roundish bulb at the base of the main growth[1]. A relatively slow-growing plant, it can be interplanted with faster maturing species such as lettuces[201]. The bulbs should be planted fairly deeply[1]. Grows well with most plants, especially roses, carrots, celery, celariac, beet and chamomile, but it inhibits the growth of legumes[18, 20, 54]. This plant is a bad companion for alfalfa, each species negatively affecting the other[201]. Members of this genus are rarely if ever troubled by browsing deer[233].

4.0.25 Hemerocallis aurantiaca

5 tlin 9 cyuc 4 kcaak 2 tcan 1 dwat 0.8 m hkuc
hmmimhtut cyutli kyucput hwicli hraşljutnyikfrip hpa7tli flat-
prikrlwis hpa7tmwatli dyatxre7t hjonli

drutta Hemerocallis aurantiaca is an evergreen Perennial growing to 0.8 m (2ft 7in) by 0.5 m (1ft 8in). See above for USDA hardness. It is hardy to UK zone 6 and is not frost tender. It is in leaf all year, in flower from June to September. The species is hermaphrodite (has both male and female organs). The plant is not self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil.

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

kcakta Edible Parts: Flowers Leaves RootEdible Uses: Leaves and young shoots - cooked[105, 177]. They must be consumed when very young or else they become fibrous[K]. Flowers and flower buds - raw or cooked. The tubular flowers are about 7.5cm long and 13cm in diameter[205]. Each stem carries 6 - 8 flowers[205]. The flowers contain carotene and starch[105, 177]. The flower buds contain about 43mg vitamin C per 100g, 983 IU vitamin A and 3.1% protein[205]. Root - raw or cooked. A radish-like flavour but not so sharp[205].

tcanta WeavingThe tough dried foliage is plaited into cord and used for making footwear[205].

dwatta Antidote Diuretic Vitamin CThe juice of the roots is an effective antidote in cases of arsenic poisoning[205]. A tea made from the boiled roots is used as a diuretic[205].

nrakta E. Asia - China, Japan, Korea. ksacta Thickets, grasslands and streamsides at elevations of 300 - 1000 metres in Guangdong, Guangxi, and Taiwan[266].

propta Seed - sow in the middle of spring in a greenhouse. Germination is usually fairly rapid and good. Prick out the seedlings into individual pots when they are large enough to handle. Grow the plants on for their first winter in a greenhouse and plant out in late spring[K]. Seed is only set if the plant is fertilized by another species, thus seedlings will not be true to the species type[233]. Division in spring or after flowering in late summer or autumn[200]. Division is very quick and easy, succeeding at almost any time of the year[K]. Larger clumps can be replanted direct into their permanent positions, though it is best to pot up smaller clumps and grow them on in a cold frame until they are rooting well. Plant them out in the spring.

nwatta Succeeds in most soils[1], including dry ones, preferring a rich moist soil[205]. Grows well in heavy clay soils. Succeeding in sun or shade, it produces more flowers in a sunny position though these flowers can be shorter-lived in very sunny positions[205]. Succeeds in short grass if the soil is moist[1]. Prefers a pH between 6 and 7[200]. Hybridizes freely with other members of this genus[200]. The roots have spindle-shaped swellings[205]. The cultivar 'Major' is smaller than the type species, but has larger flowers, it is sometimes cultivated for these edible flowers in Japan[205]. There is some doubt as to whether this cultivar really is a form of *H. aurantiaca*[205]. Individual flowers are very short-lived, opening in the morning and withering in the evening[205]. Plants take a year or two to become established after being moved[1]. Plants seem to be immune to

the predations of rabbits[233]. The plants are very susceptible to slug and snail damage, the young growth in spring is especially at risk[200]. There is some doubt as to the origins of this plant, it might have arisen in cultivation at Kew[205]. It is cultivated in Japan, where it is believed to have come from China[58]. It is quite possibly a hybrid since it is sterile unless fertilized by another species[233].

5 6 tlin

5.1 bwon

5.1.1 Elaeagnus pungens

Elaeagnus, Thorny olive, Thorny Elaeagnus, Oleaster, Silverberry, Silverthorn, Pungent Elaeagnus
tfo2n 6 tlin 10 cyuc 5 kcaak 3 tcan 2 dwat 4 m hkuc
pcimhmmimhtut cyutli hgaikyucput hwicli hysrasljutnyik-
frip hpa7tli flatprikrlwis hpa7tmwatli xre7t hjonli

drutta Elaeagnus pungens is an evergreen Shrub growing to 4 m (13ft) by 4 m (13ft) at a medium rate. See above for USDA hardness. It is hardy to UK zone 7 and is not frost tender. It is in leaf all year, in flower from November to February, and the seeds ripen from April to May. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees. It can fix Nitrogen. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in 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 and can tolerate drought. The plant can tolerate maritime exposure.

kcakta Edible Parts: Fruit SeedEdible Uses: Fruit - raw or cooked[105, 177]. About the size of a large blackcurrant, though the seed is also quite large[K]. A nice sub-acid flavour when fully ripe but astringent if eaten before then[K]. Can be made into preserves, drinks etc[183]. The oval fruit is about 15mm long[200]. Seed - raw or cooked. It can be eaten with the fruit though the seed case is rather fibrous[K]. A taste vaguely reminiscent of peanuts[K]. The seed contains 42.2% protein and 23.1% fat on a zero moisture basis[218].

tcanta Hedge HedgePlants can be grown as a hedge in exposed positions, tolerating maritime exposure[75]. Succeeds when planted under trees that have become bare at the base, in time it will scramble up into the tree and fill out the bottom[75].

dwatta Antiasthmatic Antitussive Astringent CancerThe fruit of many members of this genus is a very rich source of vitamins and minerals, especially in vitamins A, C and E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids, which is fairly unusual for a fruit. It is being investigated as a food that is capable of reducing the incidence of cancer and also as a means of halting or reversing the growth of cancers[214]. The leaves and the stems are concocted and used in the treatment of asthma, cough, diarrhoea, haemorrhoids etc[147, 218]. The seed is used to treat watery diarrhoea[218]. The root is astringent and is applied to sores, itchy skin etc[147, 218].

nrakta E. Asia - China, Japan. ksacta Sunny slopes, roadsides and thickets in lowlands, usually below 1000 metres and especially by the sea[184, 266].

propta Seed - best sown as soon as it is ripe in a cold frame[78]. It should germinate freely within 4 weeks, though it may take 18 months[K]. Stored seed can be very slow to germinate, often taking more than 18 months. A warm stratification for 4 weeks followed by 12 weeks cold stratification can help[98]. The seed usually (eventually) germinates quite well[78]. Prick out the seedlings into individual pot as soon as they are large enough to handle and plant out when they are at least 15cm tall. Cuttings of half-ripe wood, 7 - 10cm with a heel, July/August in a frame. Good percentage[78]. It is best to take the cuttings in June[202]. Cuttings of mature wood of the current year's growth, 10 - 12cm with a heel, November in a frame. Leave for 12 months. Fair to good percentage[78]. Layering in September/October. Takes 12 months[78].

nwatta Landscape Uses:Cascades, Erosion control, Hedge, Screen, Seashore. Succeeds in most soils that

are well-drained[11, 200]. Dislikes very alkaline soils[202]. Prefers a soil that is only moderately fertile, succeeding in poor soils and in dry soils[[11, 200]. Grows well in heavy clay soils. Very drought and shade resistant[200]. Tolerates maritime exposure[75]. Plants are hardy to about -15°C[200]. The foliage can be damaged in severe wind-chill conditions[202]. This is a potentially valuable fruit crop, fruiting as it does in April and May[K]. There are a number of named varieties[200, 202] and so there is plenty of scope for improving size and quality of fruit by selective breeding. Most cultivars are variegated and therefore slower-growing than the species[K]. This species is notably resistant to honey fungus[88, 200]. The small flowers have a sweet but pungent aroma. They pervade the garden for some distance on sunny days[245]. Closely related to *E. glabra*[11]. 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%. Special Features: Not North American native, Naturalizing, Fragrant flowers, Inconspicuous flowers or blooms. The plant is heat tolerant in zones 9 through 7. (Plant Hardiness Zones show how well plants withstand cold winter temperatures. Plant Heat Zones show when plants would start suffering from the heat. The Plant Heat Zone map is based on the number of "heat days" experienced in a given area where the temperature climbs to over 86 degrees F (30°C). At this temperature, many plants begin to suffer physiological damage. Heat Zones range from 1 (no heat days) to 12 (210 or more heat days). For example Heat Zone. 11-1 indicates that the plant is heat tolerant in zones 11 through 1.)

5.2 mran

5.2.1 *Quercus ilex ballota*

Holm Oak

6 tlin 9 cyuc 5 kcaak 3 tcan 2 dwat 25 m hkuc
hmimhtut cyutli tcup hwicli hrasjlutnyikfrp hpa7tli flatprikli-
wis hpa7tmwlati hjonli

drutta Quercus ilex ballota is an evergreen Tree growing to 25 m (82ft) by 20 m (65ft) at a slow rate. See above for USDA hardiness. It is hardy to UK zone 7. It is in leaf all year, in flower from May to June, and the seeds ripen from September to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Wind. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate maritime exposure.

kcakta Edible Parts: Oil Seed **Edible Uses:** Coffee Oil **Seed** - raw or cooked[1, 2, 46, 63, 200]. The seed of this variety is normally sweet. The seed is up to 3cm long[200], it can be dried, ground into a powder and used as a thickening in stews etc or mixed with cereals for making bread. The seed from some trees contains bitter tannins, these can be leached out by thoroughly washing the seed in running water though many minerals will also be lost. Either the whole seed can be used or the seed can be dried and ground it into a powder. It can take several days or even weeks to properly leach whole seeds, one method was to wrap them in a cloth bag and place them in a stream. Leaching the powder is quicker. A simple taste test can tell when the tannin has been leached. The traditional method of preparing the seed was to bury it in boggy ground overwinter. The germinating seed was dug up in the spring when it would have lost most of its astringency. The roasted seed is a coffee substitute. An edible oil is obtained from the seed[183].

tcanta Fuel Hedge Hedge Oil Repellent Shelterbelt Tannin WoodA mulch of the leaves repels slugs, grubs etc, though fresh leaves should not be used as these can inhibit plant growth[20]. Oak galls are excrescences that are sometimes produced in great numbers on the tree and are caused by the activity of the larvae of different insects. The insects live inside these galls, obtaining their nutrient therein. When the insect pupates and leaves, the gall can be used as a rich

source of tannin, that can also be used as a dyestuff[4]. Very tolerant of maritime exposure and of trimming, it can be grown as a shelterbelt tree or hedge in maritime areas[11, 29, 49, 75]. Wood - strong, hard, durable. Used for furniture[46, 61, 89]. It makes a good charcoal[89] and a good fuel, burning well even if green[146]. The bark is a source of tannin[146].

dwatta Astringent DysenteryAny galls produced on the tree are strongly astringent and can be used in the treatment of haemorrhages, chronic diarrhoea, dysentery etc[4].

nrakta Europe - Mediterranean. ksacta Arid places, maquis, woods and hills on limestone[89].

propta Seed - it quickly loses viability if it is allowed to dry out. It can be stored moist and cool overwinter but is best sown as soon as it is ripe in an outdoor seed bed, though it must be protected from mice, squirrels etc. Small quantities of seed can be sown in deep pots in a cold frame. Plants produce a deep taproot and need to be planted out into their permanent positions as soon as possible, in fact seed sown in situ will produce the best trees[11]. Trees should not be left in a nursery bed for more than 2 growing seasons without being moved or they will transplant very badly.

nwatta Prefers a good deep fertile loam which can be on the stiff side[11]. Thrives on shallow chalky soils[188]. Succeeds in all soils except those that are cold and poorly drained[98]. Grows well in sandy soils[188]. Young plants tolerate reasonable levels of side shade[200]. Very resistant to maritime exposure[11, 49, 75]. A very ornamental[1] though quite slow-growing tree[75]. Transplants badly unless moved regularly and this should be done as growth commences in late May or in September[11]. This plant is treated as a distinct species, *Q. rotundifolia*. Lam. by some botanists[50]. Cultivated for its edible seed in Spain[11, 63]. The tree grows well in Britain but is said to fruit poorly here[11], however a tree at Kew was bearing a very good crop at the end of the hot summer of 1989 and again in 1991[K]. The seed ripens in its first year[200]. Hybridizes freely with other members of the genus[200]. This species is notably resistant to honey fungus[88, 200].

5.2.2 *Crataegus tanacetifolia*

Tansy-Leaved Thorn

6 tlin 8 cyuc 5 kcaak 3 tcan 2 dwat 10 m hkuc
hmimhtut cyutli hgatyuctuphja7n hwicli hrasjlutnyikfrp
hpa7tli flatprikliwslip hpa7tmwlati xre7t hjonli

drutta Crataegus tanacetifolia is a deciduous Tree growing to 10 m (32ft) by 8 m (26ft). See above for USDA hardiness. It is hardy to UK zone 6 and is not frost tender. It is in flower in June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers dry moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit **Edible Uses:** Fruit - raw or cooked[2, 3, 105]. A good size with a soft juicy texture and an acid/sweet apple-like flavour that is very nice raw when fully ripe[11, 183, K]. The fruit can also be used in making pies, preserves, etc, and can be dried for later use. The fruit is up to 25mm in diameter[200]. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta WoodWood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[74, 82].

dwatta Cardiotonic HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta W. Asia. ksacta Dry slopes[74].
 propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. Unlike most members of this genus, the flowers are sweetly scented and free from the smell of decaying fish[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11]. This species has an excellent potential as a fruit crop in Britain. The fruit is of a reasonable size, it is usually very freely borne and the quality is very acceptable for dessert[K]. The tree is very easily grown and is little troubled by pests or diseases. It also requires very little attention, once the trees are established virtually the only work needed is to harvest the fruit each year[K]. A tree at Cambridge Botanical Gardens was about 6 metres tall and 4 metres wide in September 1993. It usually carries a very good crop of fruit[K]. A very ornamental plant[1], it is closely related to *C. laciniata*[11].

5.2.3 *Crataegus festiva*

6 tlin 9 cyuc 5 kcak 2 tcan 2 dwat 3 m hkuc
 hmimhtut cyutli hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli flatprikliwis hpa7tmwatli xre7t hjonli

drudda *Crataegus festiva* is a deciduous shrub growing to 3 m (9ft) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 7 and is not frost tender. The seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kcakta Edible Parts: Fruit Edible Uses: Fruit - raw or cooked. About 15mm in diameter with a delicious sweet flavour and juicy though slightly mealy texture[K]. This is a very acceptable dessert fruit that makes very enjoyable eating[K]. The fruit can also be used in making pies, preserves, etc., and can be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotonic Hypotensive Although no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern N. America. ksacta Not known
 propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them on in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta We have very little information on this species and do not know how hardy it will be in Britain. However, a tree growing in an open sunny position at Kew Botanical Gardens is healthy and bears a very good crop of fruit every year[K]. A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil and also in heavy clay soils[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Hybridizes freely with other members of this genus[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

5.2.4 *Ficus carica*

Fig, Edible fig, Fig Common
 6 tlin 10 cyuc 4 kcak 2 tcan 2 dwat 6 m hkuc
 htut cyutli hgatkuyctcup hwicli hyishrasjlutnyikfrip hpa7tli flatprikliwis hpa7tmwatli fyif hjonli

drudda *Ficus carica* is a deciduous tree growing to 6 m (19ft) by 6 m (19ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 7 and is not frost tender. It is in flower from June to September, and the seeds ripen from August to September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant). The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay and nutritionally poor soils. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

pcista The sap and the half-ripe fruits are said to be poisonous[20, 89]. The sap can be a serious eye irritant[238].

kcakta Edible Parts: Fruit Sap Edible Uses: Curdling agent Fruit - raw or cooked[1, 3, 3, 4, 46]. Sweet and succulent, a fully ripe specimen is an exquisite fruit that almost literally melts in the mouth[K]. The fruit is often dried for

latter use[183] and this dried fruit is a major item of commerce. Figs are usually pear-shaped and up to 5cm in diameter[200]. A nutritional analysis is available[218]. The latex from the sap can be used to coagulate plant milks[183].

cañta Landscape Uses: Container, Espalier, Specimen. Wood - pliable but porous and of little value[4, 89]. It is used for hoops, garlands, ornaments etc[89]. When saturated with oil and covered with emery is used as a substitute for a hone[4].

dwatta Cancer Demulcent Digestive Emollient Galactagogue Laxative Pectoral Stings Stomachic Tonic WartsA decoction of the leaves is stomachic[218]. The leaves are also added to boiling water and used as a steam bath for painful or swollen piles[218]. The latex from the stems is used to treat corns, warts and piles[4, 89, 218]. It also has an analgesic effect against insect stings and bites[7]. The fruit is mildly laxative, demulcent, digestive and pectoral[4, 7, 218]. The unripe green fruits are cooked with other foods as a galactagogue and tonic[218]. The roasted fruit is emollient and used as a poultice in the treatment of gumboils, dental abscesses etc[4]. Syrup of figs, made from the fruit, is a well-known and effective gentle laxative that is also suitable for the young and very old[254, K]. A decoction of the young branches is an excellent pectoral[7]. The plant has anticancer properties[218].

nrakta W. Asia - Turkey through to Pakistan; N. Africa - Algeria, Morocco, Tunisia. ksacta Amongst rocks, in woods and scrub on hot dry soils.

propta Seed - sow spring in a warm greenhouse. Prick out the seedlings as soon as they are large enough to handle and overwinter the young plants in a greenhouse for at least their first year. Plant out in late spring after the last expected frosts and give some protection for their first winter outdoors. Cuttings of mature wood 10 - 12cm with a heel, winter in a frame. Fairly easy, but the cuttings must be kept frost free. It is probably best if the cuttings are put in individual pots[78]. Layering.

nwatta Figs are plants of temperate and subtropical climates. They do not generally grow well in the wet tropics, but can be grown at higher elevations in the drier to moist tropics[418]

]. The fruits develop best when plants are grown in relatively dry climates where a cool-season alternates with a hot season[335]

]. They grow best in areas where annual daytime temperatures are within the range of 16 - 26°C, but can tolerate 4 - 38°C[418]

]. Dormant plants are hardy to about -15°C[202]

]. The top growth is susceptible to frost damage and can be killed back to the base in severe winters, though plants usually recover well[3]

]. They prefer a mean annual rainfall in the range 700 - 1,500mm, but tolerate 300 - 2,700mm[418]

]. Prefers a very sunny position but tolerates part-day shade when grown on a warm wall[202]

]. Requires a well-drained medium to light loam and some lime rubble incorporated into the soil[1]

]. Succeeds in dry soils. A heavy wet soil tends to encourage excessive plant growth at the expense of fruit production[1]

]. Prefers a pH in the range 6 - 7, but tolerates 4.3 - 8.6[418]

]. Seedling trees can commence cropping when only 3 - 4 years old, whilst cuttings can start fruiting in only 1 - 2 years[335]

]. Up to three crops of fruit a year can be obtained in some countries[46]

]. Trees have been known to live for as long as 200 years[418]

]. There are many named varieties[183, 301]

]. There are two primary types of fig:- the Adriatic fig which produces fruit without pollination; and the Symrna fig that require the presents of a fig wasp for pollination[418]

]. It is a good idea to restrict the roots of fig trees on most soil types in order to discourage excessive vegetative growth at the expense of fruit production[3]

]. This can be done by root pruning, but it is easier to place some kind of permanent restriction around the roots - planting into a large tub that is then buried into the ground is one method. It is important to make sure that the tree still gets ample moisture, especially when the fruits are ripening.

Fig trees have a unique form of fertilization, each species relying on a single, highly specialized species of wasp that is itself totally dependant upon that fig species in order to breed. The trees produce three types of flowers; a male, a long-styled female and a short-styled female flower, often called the gall flower. All three types of flowers are contained within the structure we usually think of as the fruit. The female fig wasp enters a fig and lays its eggs on the short styled female flowers while pollinating the long-styled female flowers. Wingless male fig wasps emerge first, inseminate the emerging females and then bore exit tunnels out of the fig for the winged females. Females emerge, collect pollen from the male flowers and fly off in search of figs whose female flowers are receptive. In order to support a population of its pollinator, individuals of a *Ficus* spp. must flower asynchronously. A population must exceed a critical minimum size to ensure that at any time of the year at least some plants have an overlap of emission and reception of fig wasps. Without this temporal overlap, the short-lived pollinator wasps will go locally extinct[413]

]. When grown outdoors in Britain only one crop is usually obtained, though in exceptionally hot years two crops are sometimes produced. The fruit usually takes about 12 months to mature in Britain, baby fruits no larger than about 15mm long in the autumn usually overwinter to form the following year's crop of fruit. If plants are grown in pots in a conservatory or cold greenhouse, two crops of fruit can be obtained, one in early summer and one in late summer to autumn[260]. Pinch back the new shoots to about six leaves in order to encourage the second crop[260]. Special Features: Attractive foliage, Not North American native, Invasive, 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 suckering with new plants from underground runners away from the plant [2-1].

5.2.5 *Prunus laurocerasus*

Cherry Laurel, English Laurel

6 tlin 8 cyuc 4 kcak 5 tcan 3 dwat 6 m hkuc
pcimhmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flat-
prikwls hpa7tmwatl xre7t hjonli

drutta *Prunus laurocerasus* is an evergreen Shrub growing to 6 m (19ft) by 10 m (32ft) at a medium rate. See above for USDA hardiness. It is hardy to UK zone 7. It is in leaf all year, in flower from April to June, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, Lepidoptera (Moths and Butterflies). It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

pcista All parts of the plant contain hydrogen cyanide, a poison that gives almonds their characteristic flavour. This toxin is found mainly in the leaves and seed and is readily detected by its bitter taste. It is usually present in too small a quantity to do any harm but any very bitter seed or fruit should not be eaten. In small quantities, hydrogen cyanide has been shown to stimulate respiration and improve digestion, it is also claimed to be of benefit in the treatment of cancer. In excess, however, it can cause respiratory failure and even death.

kcakta Edible Parts: Fruit Seed Edible Uses: Condiment-Fruit - raw or cooked. Sweet and reasonably pleasant when fully ripe[65, 74, K]. The cultivar 'Camelliifolia' bears huge quantities of fruit[K]. This is the size of a large cherry and, when fully ripe, has a reasonable flavour raw with a jelly-like texture and a slight astringency[K]. Some sources suggest the fruit is poisonous, this probably refers to the unripe fruit[7]. We have eaten this fruit in quite large quantities without the slightest ill effects (this also includes a 2 year old child) and so any toxicity is of a very low order[K]. However, any fruit that is bitter should not be eaten in quantity because the bitterness is caused by the presence of the toxic compounds - see the notes above on toxicity. The fruit is

about 8mm in diameter and contains one large seed[200]. Water distilled from the leaves is used as an almond flavouring[2, 46, 61, 183]. It should only be used in small quantities, it is poisonous in large amounts[183]. Seed - raw or cooked. Do not eat the seed if it is too bitter - see the notes above on toxicity.

caanta Cleanser Dye Essential Hedge Hedge WoodVery tolerant of trimming, this plant makes an excellent hedge especially in shady areas[11, 29, 200]. Some forms of this plant, notably 'Cherry Brandy', 'Otto Luyken', 'Zabelina' and 'Schipkaensis' are low-growing and make very good ground cover plants for sun or shade[182, 197]. Water distilled from the leaves is used in perfumery[4]. The bruised leaves, when rubbed within any container, will remove strong odours such as garlic or cloves so long as any grease has first been fully cleaned off[4]. A green dye can be obtained from the leaves[168]. A dark grey to green dye can be obtained from the fruit[168]. Wood - pinkish grey. Used in turnery and lathe work[74].

dwatta Antispasmodic Narcotic Ophthalmic SedativeThe fresh leaves are antispasmodic, narcotic and sedative[4, 7]. They are of value in the treatment of coughs, whooping cough, asthma, dyspepsia and indigestion[4, 238]. Externally, a cold infusion of the leaves is used as a wash for eye infections[238]. There are different opinions as to the best time to harvest the leaves, but they should only be used fresh because the active principles are destroyed if the leaves are dried[4]. Although no specific mention has been seen for this species, all members of the genus contain amygdalin and prunasin, substances which break down in water to form hydrocyanic acid (cyanide or prussic acid). In small amounts this exceedingly poisonous compound stimulates respiration, improves digestion and gives a sense of well-being[238].

nrakta E. Europe to W. Asia. More or less naturalized in Britain[17]. ksacta Woods in Britain[17].

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

nwatta Landscape Uses:Border, Screen, Specimen. Requires a well-drained moisture retentive soil[1, 11]. Grows well in heavy clay soils. Thrives in a loamy soil, doing well on limestone[11]. Prefers some chalk in the soil but it is apt to become chlorotic if too much is present, growing badly on shallow chalk[98, 200]. Extremely tolerant of shade, it succeeds in the dense shade of trees with almost no direct light and in their drip line[197, 200], though it fruits better in a more sunny position[200]. A very ornamental plant, there are many named varieties[200]. The cultivar 'Otto Luyken' is a low growing narrow-leaved form that flowers in spring and autumn. The tiny flowers are powerfully fragrant[245] but have a rather offensive odour[182]. This is a matter of opinion, some people find the smell sweet and delightful[K]. A greedy plant, inhibiting the growth of nearby plants[11], it should be introduced with care since it often self-sows in woodlands and can prevent the successful regeneration of native trees by shading out the seedlings[208]. Most members of this genus are shallow-rooted and will produce suckers if the roots are damaged[238]. The flowers attract butterflies and moths[30]. This species is notably resistant to honey fungus[88, 200]. Subject to bacterial canker which can kill large branches[124]. Trim (preferably with secateurs) in spring or late summer[200]. Old plants can be cut back hard into the old wood in spring and will soon recover[200]. Special Features:Not North American native, All or parts of this plant are poisonous, Fragrant flowers, Attractive flowers or blooms.

5.2.6 *Crataegus caesa*

6 tlin 9 cyuc 4 kcaek 2 tcan 2 dwat 3 m hkuc
hmmihmtut cyuthl hgattcuphja7n hwicli hrasjlutnyikfrip hpa7tli

flatprikwis hpa7tmwattl xre7t hjonli

drutta *Crataegus caesa* is a deciduous Shrub growing to 3 m (9ft) by 3 m (9ft). See above for USDA hardiness. It is hardy to UK zone 7 and is not frost tender. It is in flower from April to May, and the seeds ripen from September to October. The species is hermaphrodite (has both male and female organs) and is pollinated by Midges. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist or wet soil and can tolerate drought. The plant can tolerate strong winds but not maritime exposure. It can tolerate atmospheric pollution.

kaakta Edible Parts: FruitEdible Uses: Fruit - raw or cooked. A good size fruit, about 20mm in diameter, with a sweet taste and a fair fruit to seed ratio, it has a mealy texture, is fairly juicy and makes very pleasant eating[K]. It ripens in mid to late September and can hang on the tree for several weeks[K]. The fruit can be used in making pies, preserves, etc, and can also be dried for later use. There are up to five fairly large seeds in the centre of the fruit, these often stick together and so the effect is of eating a cherry-like fruit with a single seed[K].

tcanta Wood - heavy, hard, tough, close-grained. Useful for making tool handles, mallets and other small items[82].

dwatta Cardiotoxic HypotensiveAlthough no specific mention has been seen for this species, the fruits and flowers of many hawthorns are well-known in herbal folk medicine as a heart tonic and modern research has borne out this use. The fruits and flowers have a hypotensive effect as well as acting as a direct and mild heart tonic[222]. They are especially indicated in the treatment of weak heart combined with high blood pressure[222]. Prolonged use is necessary for it to be efficacious[222]. It is normally used either as a tea or a tincture[222].

nrakta Eastern N. America. ksacta Not known

propta Seed - this is best sown as soon as it is ripe in the autumn in a cold frame, some of the seed will germinate in the spring, though most will probably take another year. Stored seed can be very slow and erratic to germinate, it should be warm stratified for 3 months at 15°C and then cold stratified for another 3 months at 4°C[164]. It may still take another 18 months to germinate[78]. Scarifying the seed before stratifying it might reduce this time[80]. Fermenting the seed for a few days in its own pulp may also speed up the germination process[K]. Another possibility is to harvest the seed 'green' (as soon as the embryo has fully developed but before the seedcoat hardens) and sow it immediately in a cold frame. If timed well, it can germinate in the spring[80]. If you are only growing small quantities of plants, it is best to pot up the seedlings as soon as they are large enough to handle and grow them out in individual pots for their first year, planting them out in late spring into nursery beds or their final positions. When growing larger quantities, it might be best to sow them directly outdoors in a seedbed, but with protection from mice and other seed-eating creatures. Grow them on in the seedbed until large enough to plant out, but undercut the roots if they are to be left undisturbed for more than two years.

nwatta We have very little information on this species, and do not know how hardy it will be in this country, or even its country of origin. However, a specimen growing in an open position at Kew Botanical Gardens is about 3 metres tall and wide and regularly carries a heavy crop of fruit[K]. A very easily grown plant, it prefers a well-drained moisture retentive loamy soil but is not at all fussy[11, 200]. Once established, it succeeds in excessively moist soils and also tolerates drought[200]. It grows well on a chalk soil[200]. A position in full sun is best when plants are being grown for their fruit, they also succeed in semi-shade though fruit yields and quality will be lower in such a position[11, 200]. Most members of this genus succeed in exposed positions, they also tolerate atmospheric pollution[200]. Seedling trees take from 5 - 8 years before they start bearing fruit, though grafted trees will often flower heavily in their third year[K]. The flowers have a foetid smell somewhat like decaying fish. This attracts midges which are the main means of fertilization. When freshly open, the flowers have more pleasant scent with balsamic undertones[245]. Hybridizes freely with other members of this genus[200]. Seedlings should not be left in a seedbed for more than 2 years without being transplanted[11].

5.2.7 Fagopyrum esculentum

Buckwheat

6 tlin 12 cyuc 4 kca4 4 tcan 3 dwat 1.5 m hkuc
htut cyutli hqatkyuctup hwicli hyishrasjlutnyikfrip hpa7tli
frusflatprkrlwv hpa7tmmwlti hjonli

drutta Fagopyrum esculentum is a ANNUAL growing to 1.5 m (5ft) by 0.3 m (1ft in) at a fast rate. It is frost tender. It is in flower from July to September, and the seeds ripen from August to October. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Bees, flies. 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 and can tolerate drought.

pcista Buckwheat seed is considered to be one of the most important food allergens. It also contains compounds that can cause irritating skin disorders ('fagopyrism') mainly in sheep and pigs and occasionally in humans, especially in cases where there is heavy consumption and also exposure to sunlight[299]

]. Fagopyrism has also been observed in humans after the consumption of buckwheat honey. It may also affect cattle when fed pure buckwheat silage[299]

]. The plant has caused photosensitivity in some people, only the dehusked grain is considered to be safe.

kcakta Edible Parts: Leaves SeedEdible Uses: Rutin-Leaves - raw or cooked like spinach[4 , 183 , K] . Not that wonderful raw, they improve somewhat with cooking[K] . The leaves are rich in rutin[171] (see below for more details) and so are a very healthy addition to the diet[K] . Seed - raw or cooked. A nutty flavour, though it has a somewhat gritty texture that is not universally liked[K] . It can be cooked like rice[299] . The seed can be soaked overnight in warm water then sprouted for a few days and added to salads[183] . It can also be ground into a powder and used as a cereal[2 , 4 , 9] , when it can be made into pancakes, noodles, bread etc or be used as a thickening agent in soups etc[46 , 183] . It is popular for use in mixtures with wheat, barley or rye flour to improve the taste and nutritional value of bread and other foodstuffs. Up to 30% of buckwheat flour may be mixed in the wheat dough for baking bread[299] . Due to the absence of gluten, buckwheat is suitable for the diet of people with coeliac disease[299] . Rich in vitamin B6[160] . Excellent beer can be brewed from the grain[244] . Fresh leaves and inflorescences are used for the industrial extraction of rutin, which is applied to strengthen the inner lining of blood vessels (however, it is rather the related species Fagopyrum tataricum (L.) Gaertn., which is commonly grown for rutin production). Rutin is also industrially used as a natural pigment, antioxidant, stabilizer, food preserving and absorber of UV light.

tcanta Dye Green manure Soil reclamationA very good green manure plant, it can be used to reclaim badly degraded soils and subsoils[1, 18, 20, 201]. A blue dye is obtained from the stems[57, 106]. A brown dye is obtained from the flowers[4]. Livestock forage and feed: Buckwheat has historically been used as feed for cattle, pigs and chickens (Myers and Meinke, 1994). Green manure and cover crop:Buckwheat grows in the shortest time period of all cover crops (Bjorkman and Shail, 2010) flowering within 3 to 6 weeks and completely maturing within 11 to 12 weeks (Bjorkman et al., 2008). Weed suppressor: because buckwheat grows quickly, it is an excellent suppressor of weeds, and it has been used for this purpose in North America for several centuries. Cover crop: Buckwheat can also be grown as a cover crop to prevent erosion, improve soil aggregate stability, scavenge nutrients such as phosphorus and calcium, and mineralize rock phosphate (Clark, 2007; Bjorkman and Shail, 2010). Pollinator and beneficial insect habitat: Buckwheat is an excellent plant for bee pasture and insectary gardens(Mader et al., 2011; Lee-Mader et al., 2014). About one acre of buckwheat can provide enough forage for a hive of honey bees, producing about 150 pounds of honey in one season (Oplinger et al., 1989; Myers and Meinke, 1994). The flowers also attract beneficial insects such as parasitic wasps, minute pirate bugs, insidious flower bugs, tachinid flies, ladybeetles and hoverflies, which may prey on insect pests of neighboring crops (Clark, 2007; Bjorkman and

Shail, 2010). Wildlife habitat:Buckwheat is sometimes an ingredient in birdseed mixes and planted with other crops for wildlife food plots(Oplinger et al., 1989). USDA.gov.

dwatta Acrid Astringent Eczema Galactogogue VasodilatorBuckwheat is a bitter but pleasant tasting herb that is frequently used medicinally because the leaves are a good source of rutin[238]. Rutin is useful in the treatment of a wide range of circulatory problems, it dilates the blood vessels, reduces capillary permeability and lowers blood pressure[238, 254]. The leaves and shoots of flowering plants are acrid, astringent and vasodilator[4, 141, 165]. It is used internally in the treatment of high blood pressure, gout, varicose veins, chilblains, radiation damage etc[4, 141, 165]. It is best used in conjunction with vitamin C since this aids absorption[254]. Often combined with lime flowers (Tilia species), it is a specific treatment for haemorrhage into the retina[254]. The leaves and flowering stems are harvested as the plant begins to flower and are dried for later use[238]. They should be stored in the dark because the active ingredients rapidly degrade in the light[238]. Some caution should be exercised in the use of this herb because it has been known to cause light-sensitive dermatitis[238]. A poultice made from the seeds has been used for restoring the flow of milk in nursing mothers[4]. An infusion of the herb has been used in the treatment of erysipelas (an acute infectious skin disease)[4, 244]. A homeopathic remedy has been made from the leaves[9]. It is used in the treatment of eczema and liver disorders[9].

nrakta Probably originating in China, the plant is cultivated in many temperate areas where it sometimes escapes and is found wild. ksacta Waste ground as an escape from cultivation[17]. Its original habitat is obscure.

propta Seed - sow from the middle of spring to early summer in situ. The seed usually germinates in 5 days[115]. The earlier sowings are for a seed or leaf crop whilst the later sowings are used mainly for leaf crops or green manure.

nwatta Fagopyrum esculentum is a plant of the temperate and subtropical zones, though it can also be grown at higher elevations, generally above 1,500 metres, in the tropics[299]

]. It grows best in areas where annual daytime temperatures are within the range 17 - 27°C, but can tolerate 7 - 40°C[418]

]. It is very sensitive to frost[299]

]. It prefers a mean annual rainfall in the range 700 - 1,000mm, but tolerates 400 - 1,300mm[418]

]. A very easily grown plant, it prefers dry sandy soils but succeeds in most conditions, including poor[57

, 141

, 171

], heavy[18

] or acid soils[141

] and even sub-soils[160

]. It prefers a pH in the range 5 - 6.5, tolerating 4.4 - 7.5[418]

]. It prefers a cool moist climate, but it also succeeds in dry and arid regions[171

]. Hot drying temperatures and drying weather at blooming time blast the flowers and prevent seed formation[418

]. The plant has a poorly developed root system that makes it rather sensitive to drought[299

]. Fagopyrum esculentum is cultivated in many parts of the world for its edible seed. It is a prolific producer of seeds, and these are often spread by animal activity. It easily escapes from cultivation and can become established as a weed of cultivated and waste ground, though it is easy to control and does not usually become a pest. Buckwheat is a fast-growing plant that can reach its full height within 4 - 6 weeks. Flower formation starts 20 days after emergence, the plant continuing to flower until complete senescence and death of the whole plant. After the onset of flowering, the leaves and stems continue to grow while the fruits develop; hence seed ripening is very uneven, making harvesting difficult. From the middle of the flowering period onwards, when the leaf area has reached its maximum, further growth of the vegetative parts is slow, and producing ripe seed becomes the main focus of the plant. The seed is ready for harvesting 70 - 130 days after emergence, depending on cultivar and ecological conditions[141

, 183

, 299

, 418
]. The seed is harvested when most of it (at least 75%) is mature, and most leaves have yellowed and dropped. The crop is harvested by mowing, after which the stems are bundled and put in heaps to dry. Farmers prefer to harvest early in the morning or late in the afternoon, or even at night, when the plants are slightly damp from dew, to reduce grain shattering[299

]. The average seed yield in the United States is 0.9 - 1 tonne per hectare; in Kenya, it is 1 tonne, and in Russia 1 - 1.3 tonnes; but up to 4 tonnes can be obtained[418

]. The seed ripens irregularly over a period of several weeks, so it is difficult to harvest[141

]. Plants have poor frost resistance, but they are disease and insect resistant[166

]. They inhibit the growth of winter wheat[18

, 20

, 201

]. There are some named varieties[183

]. The flowers have a pleasant sweet honey scent[245

] and are extremely attractive to bees and hoverflies[4

, 171

].

5.2.8 Brassica juncea integrifolia rugosa

Head Mustard

6 tlin 10 cyuc 4 kca2 2 tcan 2 dwat 0.6 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikli-
wis hpa7tmwatli fyif hjonli

drutta Brassica juncea integrifolia rugosa is a ANNUAL 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 6. The flowers are pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Leaves Oil Seed Shoots
StemEdible Uses: Condiment OilLeaves and stems - raw or cooked[22 , 33 , 46 , 52 , 61]. A peppery flavour that can range from mild to hot, this is one of the most highly prized cooked vegetables in the Orient[206]. The leaves are more peppery than the stems[206]. The leaves can also be finely shredded and added to mixed salads[206]. The leaves can be harvested at any stage from seedling to maturity, becoming hotter with age[206].The protein extracted from the leaves mixes well with banana pulp and is well adapted as a pie filling[183]. Flowers and young flowering stems - raw or cooked[52]. Sweet and succulent[133]. An edible semi-drying oil is obtained from the seed[1 , 2 , 17 , 57 , 183]. The seed contains 25 - 30% oil[74]. The seed is used as a mustard flavouring[171]. It is the source of 'brown mustard'[183], a prepared mustard that is milder than that produced from other species[238]. Pungency of mustard develops when cold water is added to the ground-up seed - an enzyme (myrosin) acts on a glycoside (sinigrin) to produce a sulphur compound. The reaction takes 10 - 15 minutes. Mixing with hot water or vinegar, or adding salt, inhibits the enzyme and produces a mild bitter mustard[238]. Black mustard comes from *B. nigra* and white mustard from *Sinapis alba*. The seed is also used whole in curries and pickles[238]. They are often heated in oil to destroy their pungency and give them a nutty flavour[238]. Sprouted seeds can be added to salads.

tcanta Green manure Oil Repellent Soil reclamationOther uses rating: Low (2/5). Agroforestry Uses: There is some evidence that if this plant is grown as a green manure it is effective in reducing soil-borne root rots in pea crops[206]. This is attributed to chemicals that are given off as the plants decay[206].

dwatta Anodyne Antiarthritic Antiinflammatory Antirheumatic Antitumor Diuretic Emetic Emmenagogue Foot care Galactogogue Laxative Rubefacient Stimulant TonicReported to be anodyne, aperitif, diuretic, emetic, rubefacient, and stimulant, the plant is a folk remedy for arthritis, foot ache, lumbago, and rheumatism[269]. The seed is used in the treatment of tumours in China[269]. In Korea, the

seeds are used in the treatment of abscesses, colds, lumbago, rheumatism, and stomach disorders[269]. The root is used as a galactagogue in Africa[269]. Ingestion may impart a body odour repellent to mosquitoes[269]. Mustard oil is used in the treatment of skin eruptions and ulcers[269]. Believed to be aperient and tonic, the volatile oil is used as a counterirritant and stimulant[269]. In Java the plant is used as an antisyphilitic emmenagogue[269]. Leaves applied to the forehead are said to relieve headache[269]. The Chinese eat the leaves in soups for bladder, inflammation or haemorrhage[269].

nrakta A cultivar of garden origin. ksacta Not known in the wild.

propta Seed - sow in situ from August to October[206]. Seed can also be sown in the spring but plants are very likely to run to seed[206]. There are about 5,660 - 6,000 per 0.01 kg (1/3 oz)[269].

nwatta Originating from the central Asian Himalayas to China, the plant has long been cultivated and many forms have been developed that can be grown from the temperate to the tropical zones. Succeeds in full sun in most well-drained moisture-retentive fertile soils[16 , 200 , 206]. Prefers a heavy soil and some shade[16]. Dislikes very hot weather[33]. Plants tolerate high rainfall and, although fairly deep rooted, are not very drought resistant[206]. A form of *B. juncea* that has been selected in the Orient for its large edible leaves, there are many named varieties[206]. Plants take 3 - 4 months to reach maturity[206]. They prefer a fairly high stable temperature and are well adapted to short day length[200]. Plants have a rooting depth of between 90 - 120 cm[269]. A good bee plant[74].

5.2.9 Brassica juncea integrifolia crispifolia

Curled Mustard

6 tlin 10 cyuc 4 kca2 2 tcan 2 dwat 0.3 m hkuc
hmmihtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikli-
wis hpa7tmwatli fyif hjonli

drutta Brassica juncea integrifolia crispifolia is a ANNUAL growing to 0.3 m (1ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. The flowers are pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Leaves Seed Shoots
StemEdible Uses: CondimentLeaves - raw or cooked[22 , 33 , 46 , 52 , 61]. A peppery flavour that can range from mild to hot, this is one of the most highly prized cooked vegetables in the Orient[206]. The leaves can also be finely shredded and added to mixed salads[206]. The protein extracted from the leaves mixes well with banana pulp and is well adapted as a pie filling[183]. Flowers and young flowering stems - raw or cooked[52]. Sweet and succulent[133]. An edible semi-drying oil is obtained from the seed[1 , 2 , 17 , 57 , 183]. The seed contains 25 - 30% oil[74]. The seed is used as a mustard flavouring[171]. It is the source of 'brown mustard'[183], a prepared mustard that is milder than that produced from other species[238]. Pungency of mustard develops when cold water is added to the ground-up seed - an enzyme (myrosin) acts on a glycoside (sinigrin) to produce a sulphur compound. The reaction takes 10 - 15 minutes. Mixing with hot water or vinegar, or adding salt, inhibits the enzyme and produces a mild bitter mustard[238]. Black mustard comes from *B. nigra* and white mustard from *Sinapis alba*. The seed is also used whole in curries and pickles[238]. They are often heated in oil to destroy their pungency and give them a nutty flavour[238]. Sprouted seeds can be added to salads.

dwatta Anodyne Antiarthritic Antiinflammatory Antirheumatic Antitumor Aperient Diuretic Emetic Galactogogue Laxative Rubefacient Skin Stimulant TonicReported to be anodyne, aperitif, diuretic, emetic, rubefacient, and stimulant, the plant is a folk remedy for arthritis, foot ache, lumbago, and rheumatism[269]. The seed is used in the treatment of tumours in China[269]. In Korea, the seeds are used in the treatment of abscesses, colds, lumbago, rheumatism, and stomach disorders[269]. The root is used as a

galactagogue in Africa[269]. Ingestion may impart a body odour repellent to mosquitoes[269]. Mustard oil is used in the treatment of skin eruptions and ulcers[269]. Believed to be aperient and tonic, the volatile oil is used as a counterirritant and stimulant[269]. In Java the plant is used as an antisyphilitic emmenagogue[269]. Leaves applied to the forehead are said to relieve headache[269]. The Chinese eat the leaves in soups for bladder, inflammation or haemorrhage[269].

nrakta A cultivar of garden origin ksacta Not known in the wild.

propta Seed - sow in situ from August to October. Spring and early summer-sown crops tend to run quickly to seed, though they can be eaten whilst still small[206]. It is best not to sow the seed in very hot weather[206]. There are about 5,660 - 6,000 per 0.01 kg (1/3 oz)[269].

nwatta A form of *B. juncea* with curled leaves that has been selected in the Orient for its edibility. There are some named varieties[206]. Very hardy in cold weather, it is used more in temperate areas than in tropical ones. Succeeds in full sun in most well-drained moisture-retentive fertile soils[16], 200, 206]. Prefers a heavy soil and some shade[16]. Dislikes very hot weather[33]. Plants tolerate high rainfall and, although fairly deep rooted, are not very drought resistant[206]. Plants have a rooting depth of between 90 - 120 cm[269]. A good bee plant[74].

5.2.10 Brassica juncea tsatsai tumida

Swollen-Stem Mustard

6 tlin 10 cyuc 4 kcaak 2 tcan 2 dwat 0.8 m hkuc hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik-lwis hpa7tmwatli fyif hjonli

drutta Brassica juncea tsatsai tumida is a ANNUAL growing to 0.8 m (2ft 7in) by 0.4 m (1ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. The flowers are pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Leaves Oil Oil Seed Shoots Stem Edible Uses: Condiment Oil Oil Edible portion: Flowers, Leaves, Oil, Stem, Vegetable. Leaves and leaf stems - raw or cooked[22, 33, 46, 52, 61]. A peppery flavour that can range from mild to hot, this is one of the most highly prized cooked vegetables in the Orient[206]. The leaves can also be finely shredded and added to mixed salads[206]. The protein extracted from the leaves mixes well with banana pulp and is well adapted as a pie filling[183]. Flowers and young flowering stems - raw or cooked[52]. Sweet and succulent[133]. The stem is trimmed then washed, halved, withered slightly and preserved with salt, cayenne pepper and zanthoxylum pericarps under pressure then marketed. An edible semi-drying oil is obtained from the seed[1, 2, 17, 57, 183]. The seed contains 25 - 30% oil[74]. The seed is used as a mustard flavouring[171]. It is the source of 'brown mustard'[183], a prepared mustard that is milder than that produced from other species[238]. Pungency of mustard develops when cold water is added to the ground-up seed - an enzyme (myrosin) acts on a glycoside (sinigrin) to produce a sulphur compound. The reaction takes 10 - 15 minutes. Mixing with hot water or vinegar, or adding salt, inhibits the enzyme and produces a mild bitter mustard[238]. Black mustard comes from *B. nigra* and white mustard from *Sinapis alba*. The seed is also used whole in curries and pickles[238]. They are often heated in oil to destroy their pungency and give them a nutty flavour[238]. Sprouted seeds can be added to salads. Plants produce swellings on the stem, these can be cooked or pickled[206].

dwatta Anodyne Antiarthritic Antiinflammatory Antirheumatic Antitumor Diuretic Emetic Emmenagogue Foot care Galactagogue Laxative Rubefacient Stimulant Tonic Reported to be anodyne, aperitif, diuretic, emetic, rubefacient, and stimulant, the plant is a folk remedy for arthritis, foot ache, lumbago, and rheumatism[269]. The seed is used in the treatment of tumours in China[269]. In Korea, the seeds are used in the treatment of abscesses, colds, lum-

bago, rheumatism, and stomach disorders[269]. The root is used as a galactagogue in Africa[269]. Ingestion may impart a body odour repellent to mosquitoes[269]. Mustard oil is used in the treatment of skin eruptions and ulcers[269]. Believed to be aperient and tonic, the volatile oil is used as a counterirritant and stimulant[269]. In Java the plant is used as an antisyphilitic emmenagogue[269]. Leaves applied to the forehead are said to relieve headache[269]. The Chinese eat the leaves in soups for bladder, inflammation or haemorrhage[269].

nrakta A cultivar of garden origin. ksacta Not known in the wild.

propta Seed - sow in situ from August to October. Spring and early summer-sown crops tend to run quickly to seed, though they can be eaten whilst still small[206]. It is best not to sow the seed in very hot weather[206]. There are about 5,660 - 6,000 per 0.01 kg (1/3 oz)[269].

nwatta Originating from the central Asian Himalayas to China, the plant has long been cultivated and many forms have been developed that can be grown from the temperate to the tropical zones. Succeeds in full sun in most well-drained moisture-retentive fertile soils[16], 200, 206]. Prefers a heavy soil and some shade[16]. Dislikes very hot weather[33]. Plants tolerate high rainfall and, although fairly deep rooted, are not very drought resistant[206]. A form of *B. juncea* that has been selected in the Orient for its edible swollen stem, there are many named varieties[206]. Plants are reasonably cold-tolerant[206]. They prefer a fairly high stable temperature and are well adapted to short day length[200]. Plants have a rooting depth of between 90 - 120 cm[269]. A good bee plant[74].

5.2.11 Brassica juncea tsatsai multiceps

Green In The Snow

6 tlin 10 cyuc 4 kcaak 2 tcan 2 dwat m hkuc hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprik-lwis hpa7tmwatli fyif hjonli

drutta Brassica juncea tsatsai multiceps is a ANNUAL growing to 0.4 m (1ft 4in) by 0.4 m (1ft 4in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. The flowers are pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Leaves Oil Seed Shoots Stem Edible Uses: Condiment Oil Leaves - raw or cooked[22, 33, 46, 52, 61]. A peppery flavour that can range from mild to hot, this is one of the most highly prized cooked vegetables in the Orient[206]. The young raw leaves are pleasantly spicy but older leaves, particularly when the plant runs to seed, can become overpoweringly hot though they are still nice cooked at this stage[206]. The leaves can be finely shredded and added to mixed salads[206]. The protein extracted from the leaves mixes well with banana pulp and is well adapted as a pie filling[183]. Flowers and young flowering stems - raw or cooked[52]. Sweet and succulent[133]. An edible semi-drying oil is obtained from the seed[1, 2, 17, 57, 183]. The seed contains 25 - 30% oil[74]. The seed is used as a mustard flavouring[171]. It is the source of 'brown mustard'[183], a prepared mustard that is milder than that produced from other species[238]. Pungency of mustard develops when cold water is added to the ground-up seed - an enzyme (myrosin) acts on a glycoside (sinigrin) to produce a sulphur compound. The reaction takes 10 - 15 minutes. Mixing with hot water or vinegar, or adding salt, inhibits the enzyme and produces a mild bitter mustard[238]. Black mustard comes from *B. nigra* and white mustard from *Sinapis alba*. The seed is also used whole in curries and pickles[238]. They are often heated in oil to destroy their pungency and give them a nutty flavour[238]. The root of some forms of this species is edible[183]. Sprouted seeds can be added to salads.

dwatta Anodyne Antiarthritic Antiinflammatory Antirheumatic Antitumor Diuretic Emetic Emmenagogue Foot care Galactagogue Laxative Rubefacient Stimulant Tonic Reported to be anodyne, aperitif, diuretic, emetic, rubefacient,

and stimulant, the plant is a folk remedy for arthritis, foot ache, lumbago, and rheumatism[269]. The seed is used in the treatment of tumours in China[269]. In Korea, the seeds are used in the treatment of abscesses, colds, lumbago, rheumatism, and stomach disorders[269]. The root is used as a galactagogue in Africa[269]. Ingestion may impart a body odour repellent to mosquitoes[269]. Mustard oil is used in the treatment of skin eruptions and ulcers[269]. Believed to be aperient and tonic, the volatile oil is used as a counterirritant and stimulant[269]. In Java the plant is used as an antisyphilitic emmenagogue[269]. Leaves applied to the forehead are said to relieve headache[269]. The Chinese eat the leaves in soups for bladder, inflammation or haemorrhage[269].

nrakta Reported to be anodyne, aperitif, diuretic, emetic, rubefacient, and stimulant, the plant is a folk ksacta Not known in the wild.

propta Seed - sow in situ from June to October. Spring-sown crops tend to run quickly to seed, though they can be eaten whilst still small[206]. It is best not to sow the seed in very hot weather[206]. There are about 5,660 - 6,000 per 0.01 kg (1/3 oz)[269].

nwatta Originating from the central Asian Himalayas to China, the plant has long been cultivated and many forms have been developed that can be grown from the temperate to the tropical zones. Succeeds in full sun in most well-drained moisture-retentive fertile soils[16 , 200 , 206]. Prefers a heavy soil and some shade[16]. Dislikes very hot weather[33]. Plants tolerate high rainfall and, although fairly deep rooted, are not very drought resistant[206]. A form of *B. juncea* that has been selected for its edible leaves, there are many named varieties[206]. They prefer a fairly high stable temperature and are well adapted to short day length[200]. Plants have a rooting depth of between 90 - 120 cm[269]. A good bee plant[74].

5.2.12 *Brassica juncea integrifolia subintegrifolia*

Leaf Mustard

6 tlin 10 cyuc 4 kca2 2 tcan 2 dwat 0.3 m hkuc
hmimhtut cyutli tcup hwicli hras|lutnyikfrip hpa7tli flatprikli-wis hpa7tmwatli fyif hjonli

drudda *Brassica juncea integrifolia subintegrifolia* is a ANNUAL growing to 0.3 m (1ft) by 0.3 m (1ft in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. The flowers are pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Leaves Oil Seed Shoots StemEdible Uses: Condiment OilLeaves - raw or cooked[22 , 33 , 46 , 52 , 61]. A peppery flavour that can range from mild to hot, this is one of the most highly prized cooked vegetables in the Orient[206]. The leaves can also be finely shredded and added to mixed salads[206]. The protein extracted from the leaves mixes well with banana pulp and is well adapted as a pie filling[183]. Flowers and young flowering stems - raw or cooked[52]. Sweet and succulent[133]. An edible semi-drying oil is obtained from the seed[1 , 2 , 17 , 57 , 183]. The seed contains 25 - 30% oil[74]. The seed is used as a mustard flavouring[171]. It is the source of 'brown mustard'[183], a prepared mustard that is milder than that produced from other species[238]. Pungency of mustard develops when cold water is added to the ground-up seed - an enzyme (myrosin) acts on a glycoside (sinigrin) to produce a sulphur compound. The reaction takes 10 - 15 minutes. Mixing with hot water or vinegar, or adding salt, inhibits the enzyme and produces a mild bitter mustard[238]. Black mustard comes from *B. nigra* and white mustard from *Sinapis alba*. The seed is also used whole in curries and pickles[238]. They are often heated in oil to destroy their pungency and give them a nutty flavour[238]. Sprouted seeds can be added to salads.

dwatta Anodyne Antiarthritic Antiinflammatory Antirheumatic Antitumor Diuretic Emetic Emmenagogue Foot care Galactagogue Laxative Rubefacient Stimulant TonicReported to be anodyne, aperitif, diuretic, emetic, rubefacient, and stimulant, the plant is a folk remedy for arthritis, foot

ache, lumbago, and rheumatism[269]. The seed is used in the treatment of tumours in China[269]. In Korea, the seeds are used in the treatment of abscesses, colds, lumbago, rheumatism, and stomach disorders[269]. The root is used as a galactagogue in Africa[269]. Ingestion may impart a body odour repellent to mosquitoes[269]. Mustard oil is used in the treatment of skin eruptions and ulcers[269]. Believed to be aperient and tonic, the volatile oil is used as a counterirritant and stimulant[269]. In Java the plant is used as an antisyphilitic emmenagogue[269]. Leaves applied to the forehead are said to relieve headache[269]. The Chinese eat the leaves in soups for bladder, inflammation or haemorrhage[269].

nrakta A cultivar of garden origin. ksacta Not known in the wild.

propta Seed - sow in situ from August to October. Spring and early summer-sown crops tend to run quickly to seed, though they can be eaten whilst still small[206]. It is best not to sow the seed in very hot weather[206]. There are about 5,660 - 6,000 per 0.01 kg (1/3 oz)[269].

nwatta Originating from the central Asian Himalayas to China, the plant has long been cultivated and many forms have been developed that can be grown from the temperate to the tropical zones. Succeeds in full sun in most well-drained moisture-retentive fertile soils[16 , 200 , 206]. Prefers a heavy soil and some shade[16]. Dislikes very hot weather[33]. Plants tolerate high rainfall and, although fairly deep rooted, are not very drought resistant[206]. A form of *B. juncea* with entire leaves that has been selected in the Orient for its edibility. There are many named varieties[206]. A very fast growing variety, usually maturing within 40 days of sowing[206]. The plants in this group are fairly cold-tolerant[206]. Plants have a rooting depth of between 90 - 120 cm[269]. A good bee plant[74].

5.2.13 *Brassica napus napobrassica*

Swede

6 tlin 9 cyuc 4 kca2 0 tcan 2 dwat 0.8 m hkuc
hmimhtut cyutli tcup hwicli hras|lutnyikfrip hpa7tli flatprikli-wis hpa7tmwatli fyifxre7t hjonli

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

kcakta Edible Parts: Leaves RootEdible Uses: Leaves - cooked as a potherb[183]. A mild, cabbage-like flavour[K]. Root - raw or cooked[1, 16, 46, 171, 183]. A richer flavour than turnips, it makes a good cooked vegetable and, when finely grated, is acceptable in mixed salads[183, K]. The root can be 30cm or more in diameter, though it is usually eaten smaller since it then is more tender[K]. It is available from early autumn, and can either be left in the ground over winter to be harvested as required, or can be harvested and stored in a cool, frost-free place where it will keep for 6 months[K].

tcanta The seed contains up to 45% of an edible semi-drying oil, it is used as a luminant, lubricant, in soap making etc[13, 21, 57, 142].

dwatta Diuretic EmollientThe root is emollient and diuretic[240]. The juice of the roots is used in the treatment of chronic coughs and bronchial catarrh[240, 269]. The seed, powdered, with salt is said to be a folk remedy for cancer[269]. Rape oil is used in massage and oil baths, it is believed to strengthen the skin and keep it cool and healthy. With camphor it is applied as a remedy for rheumatism and stiff joints[269].

nrakta A hybrid of garden origin between *B. napus* and *B. campestris*. ksacta Not known in the wild.

propta Seed - sow April to June in situ.

nwatta Succeeds in full sun in a well-drained fertile preferably alkaline soil[16, 200]. Prefers a stiff moist soil and a fairly high rainfall[16, 20, 26]. Another report says that it prefers a light but rich soil and an open sunny position[264]. Succeeds in any reasonable soil[52]. Sunny days and cool nights are favourable for plant growth whilst dry

weather at harvest time is essential[269]. Swede is reported to tolerate an annual precipitation of 30 to 280cm, an annual average temperature range of 5 to 27°C and a pH in the range of 4.2 to 8.2[269]. Very young plants are susceptible to cold damage, -4°C either killing or injuring seedlings, whereas -2°C has no effect when the plants are more than one month old[269]. The garden swede is often cultivated for its edible root, there are several named varieties[183]. The plant is somewhat harder than turnips and in most parts of Britain it can usually be left outdoors all winter and harvested as required. Plants take 4 - 6 weeks longer to mature than turnips[183]. Swede is 70% self-pollinating and 30% cross-pollinated. Even if wind and insects are absent, seed are still produced. Yield increases with honeybees[269]. A good companion plant for peas but it dislikes growing with hedge mustard and knotweed[18].

5.2.14 Brassica juncea integrifolia strumata

Large Petiole Mustard

6 tlin 10 cyuc 4 kcak 2 tcan 2 dwat 0.8 m hkuc
 hmimhtut cyutli tcup hwicli hrasjlutnyikfrip hpa7tli flatprikli-
 wis hpa7tmwatli fyif hjonli

drutta Brassica juncea integrifolia strumata is a ANNUAL growing to 0.8 m (2ft 7in) by 0.8 m (2ft 7in) at a fast rate. See above for USDA hardiness. It is hardy to UK zone 6. The flowers are pollinated by Bees. The plant is self-fertile. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: mildly acid, neutral and basic (mildly alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

kcakta Edible Parts: Flowers Leaves Oil Seed Shoots Stem Edible Uses: Condiment Oil Leaves and leaf stems - raw or cooked. Flowers and young flowering stems - raw or cooked[52]. Sweet and succulent[133]. An edible semi-drying oil is obtained from the seed[1 , 2 , 17 , 57 , 183]. The seed contains 25 - 30% oil[74]. The seed is used as a mustard flavouring[171]. It is the source of 'brown mustard'[183], a prepared mustard that is milder than that produced from other species[238]. Pungency of mustard develops when cold water is added to the ground-up seed - an enzyme (myrosin) acts on a glycoside (sinigrin) to produce a sulphur compound. The reaction takes 10 - 15 minutes. Mixing with hot water or vinegar, or adding salt, inhibits the enzyme and produces a mild bitter mustard[238]. Black mustard comes

from B. nigra and white mustard from Sinapis alba. The seed is also used whole in curries and pickles[238]. They are often heated in oil to destroy their pungency and give them a nutty flavour[238]. Sprouted seeds can be added to salads.

tcanta Green manure Oil Repellent Soil reclamation Other uses rating: Low (2/5). Agroforestry Uses: There is some evidence that if this plant is grown as a green manure it is effective in reducing soil-borne root rots in pea crops[206]. This is attributed to chemicals that are given off as the plants decay[206].

dwatta Anodyne Antiarthritic Antiinflammatory Antirheumatic Antitumor Diuretic Emetic Emmenagogue Foot care Galactagogue Laxative Rubefacient Stimulant Tonic Reported to be anodyne, aperitif, diuretic, emetic, rubefacient, and stimulant, the plant is a folk remedy for arthritis, foot ache, lumbago, and rheumatism[269]. The seed is used in the treatment of tumours in China[269]. In Korea, the seeds are used in the treatment of abscesses, colds, lumbago, rheumatism, and stomach disorders[269]. The root is used as a galactagogue in Africa[269]. Ingestion may impart a body odour repellent to mosquitoes[269]. Mustard oil is used in the treatment of skin eruptions and ulcers[269]. Believed to be aperient and tonic, the volatile oil is used as a counterirritant and stimulant[269]. In Java the plant is used as an antisyphilitic emmenagogue[269]. Leaves applied to the forehead are said to relieve headache[269]. The Chinese eat the leaves in soups for bladder, inflammation or haemorrhage[269].

nrakta A cultivar of garden origin. ksacta Not known in the wild.

propta Seed - sow in situ from August to October. Spring and early summer-sown crops tend to run quickly to seed, though they can be eaten whilst still small[206]. It is best not to sow the seed in very hot weather[206]. There are about 5,660 - 6,000 per 0.01 kg (1/3 oz)[269].

nwatta Originating from the central Asian Himalayas to China, the plant has long been cultivated and many forms have been developed that can be grown from the temperate to the tropical zones. Succeeds in full sun in most well-drained moisture-retentive fertile soils[16 , 200 , 206]. Prefers a heavy soil and some shade[16]. Dislikes very hot weather[33]. Plants tolerate high rainfall and, although fairly deep rooted, are not very drought resistant[206]. A form of B. Juncea that has been selected in the Orient for its edible swollen stem, there are many named varieties[206]. Plants are reasonably cold-tolerant[206]. They prefer a fairly high stable temperature and are well adapted to short day length[200]. Plants have a rooting depth of between 90 - 120 cm[269]. A good bee plant[74].

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