

Fruit Production - Temperate Climate

Lesson 5

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Vines, Nuts and Berries

Lesson Aim

Determine the cultural requirements for different fruit crops in your locality.



NUT GROWING

There are literally hundreds of different nuts which can be grown, representing dozens of different families. Unlike other groups of plants, it is extremely hard to generalize when considering "how to grow nuts". You will find common needs for nuts which belong to the one plant family, however, between families, the requirements can vary greatly.

Examples

Hazelnuts will thrive where apples do well and tolerate most soil conditions. They flower in the winter and require wind pollination from another suitable cultivar, however too much wind, or not enough, will adversely affect pollination. They also require regular watering during the summer period and fertiliser applications need to be adequate so as to produce the highest possible yields. Hazelnuts can withstand temperatures down to -15° Celsius but temperatures below -5°C during pollination during the pollination period will drastically reduce yields.

Almonds won't tolerate wet feet so well drained soils are imperative for good cropping. They do not tolerate frosts with extensive flower and fruit losses during frost periods. A position that has moderate to light winds is suitable. Almonds prefer hot and dry growing conditions however the trees will need to be watered during the crucial kernel maturation period as lack of water at this time will lead to immature fruit drop.

Walnuts are also suited to the same conditions required for apple trees. A deep soil that has good water holding capacity but is still well drained is essential for healthy growth. Deep organic mulch of at least 15cm will aid in the kernel formation as well as water retention in the soil. Walnuts like to grow in sheltered positions and need an adequate supply of water and nutrients to help in fruit development. Walnuts exude a chemical from the roots that inhibits the growth of most other plants. They are therefore best grown well away from other fruiting trees on a mixed tree farm.

Most nuts prefer to grow in reasonably deep, well drained loam or sandy soils that are slightly acid. Apart from pecans which will tolerate heavier sub-soils the majority of nut species do not perform well on heavy clay soils. When choosing a site take into consideration the amount of space required (most nut trees become very large) likelihood of frosts and strong windy conditions, as most nut trees are either intolerant of frosts or experience heavy crop losses through hard winds.

It is important to choose species and cultivars that are bred to specific local requirements it is no use trying to grow trees, particularly for commercial use, that are suited to tropical conditions in a cold climate and visa-versa

Nut trees are generally wind pollinated and most will require a cross pollinator planted close by (within 30m or so) for successful pollination.

Walnut (*Juglans seiboldiana*)

The walnut is unsuited to warm or humid climates but good in cool hill areas of Europe, America and southern Australia). Ideally walnuts need deep, fertile, moist soils; plant with 20 metres (60ft.) between trees in cooler areas - closer in warmer areas. Propagate by seed or grafting onto seedlings. Roots produce a substance toxic to other plants, so keep away from other crops. Normally takes 5 years to commence cropping but longer to reach peak production. You can't go far wrong growing walnuts - as with most nuts - demand is good and keeping qualities are excellent.

Chestnuts (*Castanea sativa*)

Chestnuts ideally need good rainfall and cooler mountain areas (e.g. parts of Europe and North America), shelter from north winds, deep well drained soils, space on a 12m grid, young trees need feeding and protection from frosts. In areas below 75cm rainfall - young trees require irrigation.

Propagation: grafted trees take 3 to 6 years to crop, seedlings take up to 20 years. Stratify seed over winter before sowing. Fruit ripens over a period of time through autumn. Nuts are beaten out of husks and marketed at once or else prepared for storage. Once dry, pack in alternate layers of dry sand in a cool dry position - will store this way for several months. A good selection of different varieties is needed to achieve good crops.

Almond (*Prunus dulcis*)

Ideally sunny warm site, drained soil, not alkaline, 6m x 8m spacing (can be closer), irrigate and feed regularly to achieve good results. Needs frost free situation late winter and early spring (i.e. frost will kill young fruit or flowers). Cross pollination is essential. Propagate by budding or grafting onto peach or plum rootstocks.

'Californian Papershell', 'Strout's Papershell' and 'Ne Plus Ultra' will cross pollinate with each other. 'Challeston', 'Johnston's Prolific' and 'Brands Jordan' cross pollinate each other. After harvest, lay out on racks or plastic and air to dry. Next remove husks and grade according to size for bagging.

Peanut (*Arachis hypogaea*)

Although technically a legume, peanuts are grouped with nuts for this lesson. Peanuts are suited to subtropical regions, though it is possible to obtain small crops in temperate regions provided frosts are avoided. Usually planted in spring 5 - 7.5cm deep in light soils; 2.5cm deep in heavier soils. Respond well to initial feeding. If soil is more acid than pH 6 to 6.5, an application of lime can be useful. In areas with a rainfall less than 60cm, the crop should be irrigated. They are usually grown broad-acre. The plants are a low bush. Nuts are ready for harvest when the plant starts to yellow and growth begins to slow. The time of harvest is critical. When harvest is getting close, inspect the crop frequently.



Macadamia (*Macadamia integrifolia* and *M. tetraphylla*)

Grows in tropical and sub-tropical climates.

Macadamias were first farmed widely in Hawaii, even though they come from Australia. They will grow in most parts of Australia but best suited to the warmer climates of coastal south Queensland and northern New South

Wales. Macadamias are native to this part of Australia. Slow to grow and crop in cooler climates. Grow from seed, cuttings, budding, grafting and layering. Seed needs to be planted fresh (as soon as mature). Require good drainage but moist soils (annual rainfall of 150cm in their native environment). Start fruiting at about 5 years, crops over a period of several months. Demand is well in excess of supply.

Pollination: Many Australian growers use the native stingless bee, *Trigona carbonaria* to pollinate Macadamia flowers as the European honey bee can be too damaging to the flower parts.

Pecan (*Carya illinoensis*)

Pecan production is a huge industry in the USA. Commercial plantings have also been established over the later part of the 20th century in Australia and they are proving very worthwhile. For good tree growth and top production pecans require a deep well drained, well aerated soil free of hardpan sub soil layers. Respond well to nitrogen fertilisers, continuous soil moisture from rain or irrigation is essential, susceptible to zinc deficiency. Pecans need warmth and sun. Propagate by softwood cuttings, budding and grafting. Prune to a modified central leader system.

American Hazelnut (*Corylus americana*)

Ideally cooler climates - affected by too much sun; they are grown with the filbert to provide cross pollination.

Filbert (*Corylus avellana* and *C. maxima*)

Ideally shaded site, unsuited to warm areas, good drainage, moist fertile soils, relatively small deciduous tree or shrub. Propagate by seed, layering or grafting. The filbert lives about 150 years. It yields in 4th or 5th year but takes up to 15 years to come into full bearing. It needs cross pollination.

Pistachio (*Pistachia vera*)

Only grown in warmer climates pistachio is a small to medium deciduous tree that can live several hundred years. It needs long hot dry summers, though it can survive winter temperatures well below freezing. While they will survive on poor soils, they yield best on deep well drained sandy loams. It does well on alkaline soils. For best results, feed pistachio annually with nitrogen fertiliser. There are both male and female trees. You should normally plant one male to every 10 to 12 females.

Other Edible Nuts

Some other plants which can provide edible nuts are: *Araucaria bidwilli*, *Juglans cinerea*, *Pinus coulteri*, *Pinus pinea*, *Ginkgo biloba*, *Fagus grandiflora*, *Fagus sylvatica*.

VINES

Passionfruit (*Passiflora* sp.)

There are several different types of passion-fruits grown for their edible fruit. All are climbers, grown on trellis, fences or pergolas.

While most grow well in warmer climates, *Passiflora edulis*, the black or purple passionfruit is the only one which does well in cool temperate climates.

In cooler climates passionfruit should be grown on a trellis next to a brick wall facing the midday or afternoon sun.

All prefer fertile, well drained loamy soil, but will adapt to most soil types provided they are never waterlogged. Soil should never be too acid (i.e. If pH is below 5.5 add lime). Constant moisture is needed particularly during flowering and fruit development. Mulching and regular watering is beneficial.

Various insects attack the foliage but not the fruit. The most serious problem is virus. Viruses can cause vines to deteriorate after 4 to 5 years producing increasingly drier, woodier fruit.

Passionfruit is eaten fresh, used for flavour in drinks and cooking. Pulp or whole fruits can be frozen.

VARIETY	Fruit	Climate	Comments
Black Passionfruit (<i>P. edulis</i>)	Black, round, heavy crops	Warm, humid to cool areas. Withstands only light frosts. In warm areas grow in semi shade.	Replant after 5 years due to virus problems. Harvested when they change colour - or fall to the ground. Grafted types fruit better and are hardier.
Golden Passionfruit (<i>P. edulis var. flavicarpa</i>)	Yellow skin, crops can be light, orange pulp, round fruits	Frost tender but will grow in warmer wet, temperate areas	Virus can be a problem. Use grafted plants to avoid root rots. Harvest twice weekly after fruit drops to the ground
Banana Passionfruit (<i>P. mollissima</i>)	Long yellow fruit, less flavour than <i>P. edulis</i>	Hardier than <i>P. edulis</i> . Suits cooler areas.	Not as suited to warm areas, vigorous climber.
Water Lemon (<i>P. laurifolia</i>)		Only close to tropics	Hand pollination may be needed for good crops
Granadilla (<i>P. quadrangularis</i>)	Very large Yellowgrey pulp	Only in wet tropics and sub - tropics	Hand pollination may be needed

Chinese Gooseberry (*Actinidia chinensis*)

Also called kiwi fruit, this vigorous vine comes from sub-tropical China, but adapts to cooler climates, provided protected from frost and wind. It needs well drained soils, and is usually planted 710m between plants on a fence or trellis. These plants are extremely heavy feeders, each plant needing around 0.7 kg of blood and bone (or something similar) in the first year and mature plants needing 5kg or more of fertiliser annually to give the best crops.

It is necessary to have both a male and female plant to produce fruit, and for optimum results grafted plants are the best. Up to eight females can be planted for every male. These plants are well suited to growing over a pergola, providing fruit in winter and shade in summer.

Pick when fruit is still slightly firm (late autumn to early winter in cool temperate climates). Pest and disease problems are few apart from birds.

Fruit is mainly eaten fresh, but can be bottled or made into jam. At 9 years old, a plant produces 1525 kg. Popular varieties include 'Bruno' and 'Hayward'.

Grape (*Vitis vinifera*)

The grape vine is one of the most popular fruits you can grow.

Grapes tolerate cold when dormant (over winter) but not when in leaf. Late frosts can be a problem. Their ideal climate is a warm, dry summer and a mild to cool winter. There are varieties have been bred which will tolerate very cold winters though.

Where to Grow Grapes

Typically, different sites in the same locality can vary a great deal in their climatic characteristics and suitability for growing grapes.

- A warm site has an aspect which faces the midday sun (on a slope facing north in the southern hemisphere). It will miss early and late season frosts which affect other parts of the locality because cold air will fall into the valleys below. Where a slope facing the midday sun is at a higher altitude, the advantages found normally are counteracted by the cold which comes from being at a higher altitude.

- A cold site has an aspect facing away from the midday sun. It heats up less in summer because it gets less direct sun. Being higher up the slopes it still may miss early and late frosts which drain into the valleys below.
- A very cold site is a low spot in a valley which gets less direct sun than other sites and collects frosts earlier and later in the season than other places. The top of a hill may also be exposed to cold winds.
- An average site is flat. Frosts do not drain away as easily as on sloping ground. Sun is collected in summer or winter at an average rate.

NB: prevailing winds, shade from trees and buildings etc. can also affect the climatic characteristics of a site.

Once established, grapes should be pruned every winter removing a large proportion of the previous season's growth. This stimulates lots of new growth which is needed to produce fruit. Grapes take 34 years to reach full size and begin cropping. Fruit matures over late summer and early autumn. Fruit is particularly susceptible to disease if it becomes wet. Under humid or wet conditions, spraying is essential. Birds and caterpillars are the most common pest problems.

Grape Varieties

Variety	Fruit Colour	Fruit Maturity	Climate	Comments
Calmeria	Green	Late	Warm to hot	Tolerates rain better
Cardinal	Red	Early	Dry and hot	Rampant grower
Concord	Black	Midlate	Cooler areas	Good eaten fresh
Himrod	Green	Earlymid	Cooler areas	Almost seedless fruit
Muscat	Black	Mid-season	Adaptable	Good for home gardens
Sultana	White	Midearly	Dry and warm	Seedless, excellent fresh or dried.
Waltham Cross	Green	Midlate	Mild to warm	Vigorous growth, large berries

BERRY FRUIT

Berries are a wonderful crop to grow. Unlike other fruits, most berries are small plants, able to be grown in smaller places, and are faster to mature, often giving you a crop in the first year. Though most berries come from temperate climates, you can also grow at least some types in much warmer areas, as long as they receive ample water and appropriate protection.

Quick Guide to Choosing Berries

Berry	Expected time to bear well	Suitable climates	Worst problems	Some popular varieties
Blueberry	46yrs	Cool/Mild	Few apart from birds	Highbush types
Boysenberry	12yrs	Cool	Thrip, birds, anthracnose	*
Currant	23yrs	Cooler	Leaf diseases, aphid, mites	'Fay's Prolific', 'La Versailles'
Gooseberry	23yrs	Cooler	Leaf diseases, mites, aphid	'Roaring lion'
Loganberry	12yrs	Cool	Anthraco, thrip, birds	*
Raspberry	12yrs	Cooler to mild	Thrip, grubs, botrytis, anthracnose	'Everbearer' (late), 'Neika', 'Willamette'
Strawberry	1yr	Cooler to warm	Botrytis, virus, mites thrip, slugs	'Red Gauntlet', 'Cambridge Vigour'
Youngberry	1yr	Cool	Thrip, birds, anthracnose	Thornless type

* These are hybrids or varieties of the blackberry.

Strawberries

One of the most popular berries grown in home gardens, strawberries will bear fruit for up to six months, each plant yielding up to half a kilogram of delicious fruit each year. Strawberries are used fresh, marketed frozen, processed in foods such as jam and ice cream, or used to flavour drinks such as milkshakes.



Strawberries can be grown in a wide range of climates ranging from cold to sub-tropical areas. They will benefit from protection against frosts, and against cold and wet conditions during autumn. Movable plastic tunnels known as cloches are widely used for this purpose.

Strawberries grow best in deep, well drained, slightly acid to slightly alkaline soils. Poorly drained heavy clay soils should be avoided. They are heavy feeders and will benefit from the application of large amounts of well-rotted organic matter such as composts and manures, prior to planting. Side dressings of fertilisers during active growth periods are important. Regular moisture is important for good fruit production.

Where to Plant Strawberries

For commercial growers raised beds are formed approximately 1520cm high and 6090cm wide. This will be wide enough for two rows of plants. The length of the rows will depend on the amount of space you have available and how many plants you wish to grow. If you want to use more than one bed then you should allow sufficient space between the beds for easy access. There should be a 30cm gap between the two rows in the bed and about 30 40cm between individual plants in each row.

Black polythene sheeting can be used as a mulch to help control weeds, warm the soil, maintain moisture levels, and keep the fruit off the soil thereby keeping them clean and less likely to suffer pest and disease problems. The surface of the raised bed should be even so that the plastic lies flat against the soil surface. The edges of the plastic are buried under the soil alongside the beds. A row of small holes should be made in the plastic down the centre of the bed to allow water penetration.

To plant simply make a small slit in the plastic at the correct spacing and push the plant into the soil, making sure the roots are pushed well into the soil. The base of the plant should be level with the plastic sheeting. The plants should then be watered well. Installation of a trickle irrigation system with individual drippers to each plant will generally give a significant yield increase. Planting times are autumn to early winter in cool to mild climates and late summer to autumn in warm climates.

Once plants are established remove any runners to promote fruiting. During winter remove old growth and trim the remaining top growth to reduce pest and disease problems. At all times, particularly in active growth stages maintain adequate moisture levels. As fruit ripens reduce watering to produce firmer fruit. A virus disease makes it necessary to treat plantings as a short-term proposition. Plants are usually cropped for 23 years and then new plantings are carried out using certified virus free runners.

Strawberries should be harvested in the cooler part of the day every second day. Pick with the stem intact except when you are making jam. This reduces the likelihood of fungal problems occurring. They should be stored in cool conditions e.g. refrigerator. If the berries are to be kept for any length of time they should be frozen.

The commercial strawberries are cultivars derived from hybrids between *Fragaria chiloensis* and *F. virginiana*. There are many cultivars available world-wide to suit various climatic conditions. Contact your local department of Agriculture or equivalent to research the varieties available to your region.

Raspberries (*Rubus idaeus*)

Raspberries prefer a cool protected, moist, but well drained site with acid soil, and are preferably grown on raised mounds. They need some winter chilling to produce good crops. They are heavy feeders and benefit from applications of well-rotted compost or animal manures, or a complete N.P.K fertiliser with a high nitrogen level. Grow them on a trellis, fence or stake. The fruit is produced on two-year-old canes. After the canes produce a crop they are removed - new growth is left though to produce fruit the next year (NB: this pruning is done every winter). Don't damage roots by cultivation. Propagate by suckers, root cuttings or tip layers. Raspberries are harvested in summer twice weekly. Store the fruit in cool conditions as soon as they are picked. The fruit is generally eaten fresh, frozen or used for jam.

Variety	Fruit	Comments
'Heritage'	Prolific cropper	Crops in autumn
'Nootka'	Good colour and flavour	Midseason crop. Some disease resistance.
'Everbearer'	Large, Excellent flavour	Autumn cropper
'Skeina'	Good flavour	Early cropper

Cape Gooseberry (*Physalis peruviana*)

The Cape gooseberry likes full sun and needs protection from frost and cold winds. It prefers light well drained soils but grows in most soils as long as they are not too acidic. It is a heavy feeder, and can be propagated from seed sown in late winter under glass and planted out after the frosts. It is related to tomatoes and can be treated similarly. Its main use is for jam, but it can also be eaten fresh or stewed. Ripening takes a long time and is indicated by drying of the husk.

Gooseberry (*Ribes grossularia*)

This is not related to the cape gooseberry but comes from the same genus as currants. It is an easy to grow crop for cooler climates. It should be grown ideally in a cool, well drained situation in full sun or semi shade, with some protection provided against strong winds and hot sun. Adequate moisture during the growing season is essential for good cropping.

Space plants about 0.75 metres apart. Avoid damage to roots by close cultivation. Remove old wood from established plants to encourage new growth. They can be propagated from hardwood cuttings 30cm long in winter. They produce their first crop in 3-4 years. Harvesting occurs during mid spring to late summer depending on variety.

For canning, pick before the fruit starts to colour (green), for eating fresh wait until ripening is well in progress (i.e. has turned red). They are relatively easy to handle because they are firmer than other berries. Prune annually. Fruit occurs on spurs and 2nd year old laterals.

Mulberry (*Morus nigra*, *Morus alba* and *Morus rubra*)

The Mulberries are hardy and long lived (well over 100 years) plants, but slow to come into bearing. Crops are reliable once they start. The black mulberry (*M. nigra*) grows best in cool temperate climates, while the white mulberry (*M. alba*) prefers a milder climate with a humid summer. The red mulberry (*M. rubra*), has similar requirements to the white mulberry. All prefer deep fertile soils. They grow up to 10 metres high with a 10 metre spread.

Flowers occur over a long period, with male and female flowers carried in separate catkins. The fruit start ripening in early summer and will continue for some time. Unfortunately, fruit tends to drop before fully ripe.

Blueberry (*Vaccinium* sp.)

Blueberries need a moist cool site (not waterlogged) and an acidic soil (pH 4.5 ideal) with a high organic content. They are very susceptible to hot summers, late frosts, waterlogged soils and salt. Some shade is tolerated, but full sun is better. Being shallow rooted, they grow best on well drained, heavily mulched soils. Blueberries are heavy feeders and benefit from applications of well-rotted manure, and a general fertiliser high in nitrogen. Always grow two different varieties together as cross pollination is necessary for good crops. Birds and occasionally fungal disease (e.g. botrytis) can attack the fruits otherwise blueberries are relatively pest and disease free. Bird netting is frequently erected on a framework above the plants for protection.



Main Types

- "Highbush blueberry" (*Vaccinium corymbosum*) - a large bushy shrub to 2m tall with larger dark coloured fruit.
- "Lowbush blueberry" (*Vaccinium angustifolium*) - small shrubs to 0.5m tall with smaller lighter coloured berries.
- "Rabbiteye blueberry" (*Vaccinium ashei*) - large shrubs to 2m tall; more hardy than other types; with dark, but small berries.

It is important to choose the best variety for your situation. Ripening time, growth vigour, size of crop and taste can vary greatly from one variety to the next.

Varieties for Cool-Temperate Climates

Note you will need to research the varieties that are available in your region to best suit your local climatic conditions.

Variety	Vigour	Ripens	Comments
'Margaret Blue'	Very strong	Early	Good crops by 4th year, good taste
'Barbara Blue'	Good	Midlate	Very sweet berries but takes longer for good crops
'Annie Blue'	Average	Earlymid	Sweet fruit, average crops in 4th year
'Blue Rose'	Extremely strong	Earlymid	Large slightly acidic berries, average crops by 4th season
'Brigitta Blue'	Strong	Late	Sweet fruit, average crop in 4th year
'Denise Blue'	Smaller, spreading	Early	Large distinctive berries, above average crops in 4th year.
'Jenny Blue'	Good	Earlymid	Heavy crops by fourth year, slightly acidic berry
'Michelle Blue'	Good	Late	Large sweet berries, but takes longer to produce heavy crops

Blueberries start bearing about 3 years old. Fruit is fully ripe when dark blue or blue-black colour. They are one of the last of the summer berries to ripen. Harvested berries should be stored quickly in cool conditions. They store well when frozen.

Elderberry (*Sambucus nigra*)

Well suited to cool areas, semishade is ideal but full sun is acceptable in cooler areas. Elderberry grows well in most soils and is easily propagated from cuttings. Berries can be used for wine or preserves but are not eaten fresh!

Currants (*Ribes* sp.)

Currants are best suited to cold climates, growing well in cool mountain areas. They need very cold winters and mild summers, without (or protected from) late frosts which can reduce cropping. They tolerate most soils provided not water-logged. There are three main types; black, red and white. Grown as deciduous bushes black currants fruit well on young wood; red currants fruit best on spurs. Currants don't usually crop until second season, but will then fruit for 3 to 4 seasons or more.

American Cranberry (*Vaccinium macrocarpon*)

A low growing evergreen vine, related to the blueberry, producing berries from mid-autumn to mid-winter. They perform best in cool areas, though heavy frosts damage flowers and fruit. Cranberries will however withstand extreme cold over winter. They are often grown in bogs (ie. low sites, very wet, can even become flooded at times). Prepare for planting by digging a trench 30cm below ground level, mix lots of compost into the bottom of the trench and place 5cm – 7.5cm layer of sand on top of this. Plant into the sand at the bottom

of trench and keep moist.

Bramble Fruits (*Rubus* species)

These include loganberry, youngberry, boysenberry, lawtonberry, mammothberry, phenomenalberry, dewberry, and blackberry hybrids. All have a long trailing habit and are grown on a trellis. Because of their tart flavour, most are used for preserves.

Loganberry

The loganberry and one of the easiest soft fruits to grow and handle, it is suited to a wide range of soils; it often grows where other berries won't. Avoid exposure to hot north winds, ensure good drainage and control weeds. Plant loganberries 1.52m apart on a trellis or wire mesh fence 1.5m tall; prune annually to stimulate young shoots which produce future fruit. Harvest fruit from late spring to mid-summer, depending on your locality. Reasonable crops occur after 2 years and continue for 10 years or more.

Other Brambles

All brambles are grown much the same way and under the same conditions as the loganberry described above.

- Youngberry - matures early to midsummer.
- Boysenberry - looks identical to the loganberry but matures later in mid to late summer.
- Lawtonberry - smaller fruit than loganberry but heavier crop.
- Mammothberry - also grown commercially in some regions as the black loganberry. Fruit is like a large blackberry.
- Phenomenalberry - similar to the loganberry in quality and appearance. Ripens a week or so later than the loganberry.

SET TASK

Plan the development of a berry growing area for a farm. Contact companies, visit nurseries and check the availability, quality and prices of berry plants you would like to grow on your site (or proposed site). Work with an imaginary site if you do not have a real-life situation to deal with. Consider the option of a pick your own operation. Do you get lots of tourists in your region? Could you deal with the public?