MISSISSIPPI STATE UNIVERSITY EXTENSION

Fruit and Nut Review: Citrus

Citrus fruits are among the most popular fruits produced in tropical and subtropical areas of the world. Most citrus originated in China and southeast Asia; lime was likely developed in India.

Members of this group are small trees or shrubs. This group contains orange, grapefruit, lime, lemon, and tangerine. The kumquat is closely related and has been used in breeding programs to produce the limequat, orangequat, and citrangequat.

The fruit is a berry made up of 10 to 13 segments called locules that are filled with juice sacs containing sugars and acids. If sugars prevail, the fruit may be very tasty, as are tangerines and most oranges. If acids prevail, the fruit may be quite tart, as are lemons and limes.

Lemons and limes are often used as seasonings in cooking. Their juices may be diluted with water to which sugar has been added to make a refreshing drink. Citrus fruits are high in vitamin C.

Adaptation

Since citrus fruits are tropical or subtropical in origin, winter protection is a must. The lowest temperature at which growth in citrus occurs is 55°F; the highest is about 100°F. The best temperature range is 70 to 90°F.

Hardiness differs according to species and sometimes variety. The tree can usually withstand temperatures 3 to 4 degrees cooler than the fruit. Ripe fruit can withstand lower temperatures than green or immature fruit. The following table indicates the lowest temperature a citrus tree can withstand without damage (Table 1). Remember, fruit injury occurs at temperatures several degrees warmer.

The duration of the cold period is as important as how low the temperature gets. It usually takes 3 to 4 hours at 27 to 28°F to injure naval oranges. However, only 30 to 60 minutes at 29°F will injure small lemons. To prevent cold injury to citrus, you need a greenhouse conservatory, or "Florida room." With recent severe winters and late spring

Table 1. Cold hardiness of citrus trees.

Fruit	Temperature (degrees F)
Grapefruit	23–24
Orange	23–24
Kumquat	16–17
Lemon	26–27
Lime	28
"Satsuma" mandarin orange, fully dormant	18
All other mandarin oranges	22–23

freezes, many outdoor citrus plants have been killed back to the graft union. The understock may regrow, producing a seedy, sour, and inedible fruit.

When grown outdoors, citrus plants require a well-drained soil rich in organic matter. In containers, most commercial potting soils are adequate. The soil pH should be slightly acid to near neutral. Citrus plants grow best in full sun.

Variety Selection

Citrus plants can be some of the most rewarding plants for the home gardener when you consider qualities of citrus. They produce a deep emerald-green foliage, white, sweet-smelling flowers, and highly colored fruit. Even citrus that is not edible can be grown as an ornamental. Plant sizes range from small shrubs (such as the Meyer lemon) to large trees (such as the grapefruit). Provided you meet the climatic requirements (winter protection, light) and space requirements, you can grow any citrus variety.

Citrus plants are self-fruitful—only one plant is required for fruit production. However, cross-pollination enhances fruit set and increases production. If space permits, grow at least two varieties.

Orange (*Citrus sinensis*)

The only orange variety recommended for growing outdoors along the Gulf Coast is the "Washington Naval." This variety requires a protected area such as the south side of your home. The most distinctive fruit feature is the presence of the navel, a small, rudimentary fruit embedded in the blossom end of the orange. Other distinctive features are its lack of seed, thick skin, ease of peeling, ease of separation of segments, and its richness of flavor. The fruit color is deep orange. This variety may be grafted onto the trifoliate orange or Troyer rootstock. Grafting onto the trifoliate orange increases its cold hardiness.

For growing in greenhouses or a Florida room, you may also select Robertson Naval or Summernavel in addition to the Washington variety. For common oranges, consider Hamlin, Marrs, Parson, Pineapple, and Valencia. For sour oranges, consider Bouquet, Chinotto, or Seville. Sour oranges are excellent for marmalades.

Grapefruit (*Citrus paradisii*)

Recommended varieties of grapefruit include Duncan and Ruby Red, the most widely planted variety. The fruit is medium-sized and has few, if any, seeds. It is light yellow with a red blush at maturity. The fruit holds well on the tree. Harvest time ranges from December through May. It may be grafted onto the trifoliate orange understock. Duncan is a seeded fruit and medium in size. For growing in greenhouses or a Florida room, you may also select Marsh.

Lime (*Citrus aurantifolia*)

Limes do not tolerate cool climates and are not normally planted farther north than Florida. A hybrid between lime and kumquat (limequat) is more cold hardy and may be grown outdoors along the Gulf Coast.

Limequats are similar in appearance and can be used in the same way as limes. The fruit is not as bitter. It is pale yellow and about 1 inch in diameter when mature. Standard trees may reach 6 to 10 feet tall, with dwarfs reaching 3 to 5 feet. Lakeland and Eustus are good varieties of limequat. For growing in greenhouses or a Florida room, you may also select the lime varieties of Bearss (Tahiti or Persian), Mexican (Key), or Rangpur.

Lemon (*Citrus limonia*)

Lemons, like limes, are sensitive to cool climates. The variety most often grown along the Gulf Coast is Meyer because it is the most cold hardy of the lemons. Meyer is sweeter and has less acid than other lemons. It does require winter protection. For growing in greenhouses or a Florida room, you may also select Eureka, Improved Meyer, Lisbon, or Ponderosa in addition to Meyer.

Mandarin Orange (*Citrus reticulata*)

The Mandarin orange is also known as satsuma and tangerine. The fruit is smaller than regular oranges; the skin is a deeper orange and is easily removed from the fruit.

Kimbrough is probably the most cold hardy of the Mandarin oranges. It was selected from seedlings of open-pollinated Owari satsumas that survived freezes.

For growing in greenhouses or a Florida room, you may also select Owari, Armstrong Early, Ponkan, and Satsuma.

Plant

Plant citrus the same as other fruit trees if planting outdoors. If planting in containers, select ones large enough to accommodate the mature size of the citrus plant you choose to grow. Plant as you would other container plants, but be sure to set the plant no deeper than it grew in the nursery.

Fertilize

You must maintain a regular fertilization program for citrus. For the Gulf Coast, three applications per year between February and September are usually sufficient for older trees.

In the absence of a soil test, for the first application use a complete fertilizer such as 6-12-6, 8-8-8, or 13-13-13. Apply the equivalent of 1/2 pound of actual nitrogen per tree at this time. For the remainder of the fertilizer applications, use ammonium nitrate. Apply about 1/2 pound of actual nitrogen per tree at each application.

For trees less than 3 years old, apply about 0.1 to 0.2 pounds of nitrogen per tree at each application. Fertilize young trees four or five times between February and September.

If you are growing your citrus in containers, use houseplant fertilizer. For the application in January or February, select a house plant fertilizer high in phosphorus (the middle number). At other times, use an even analysis such as 20-20-20. Follow the label instructions for rates and frequencies.

Water

Water is important for citrus. Drought during flowering causes fruit not to set. A lack of water at other times causes fruit to drop and yields to be lower. Extended droughts can cause leaves to drop and plants to die. Care in selecting the planting site is important, because citrus plants cannot tolerate wet feet and standing water can kill them. Plant in well-drained locations and water often and deeply during dry periods.

Prune

There are several reasons for pruning citrus trees. The first pruning should be to balance the shoot-growth potential with the root's supportive capacity. This increases the chances for a successful transplanting.

Pruning to create a scaffolding network helps assure maximum fruit yield. Scaffolding branches should be no lower than 18 inches from the ground. Select three or four branches evenly spaced about the main trunk and between 18 inches and 48 inches above the ground. These will be the tree's primary branching structure. Remove all other branches.

Prune to remove any dead, diseased, or damaged limbs. Also, remove any limbs that may touch and rub. Cold-damaged wood may not be noticeable until plants begin to grow in the spring. Do not make any cuts below the graft union.

Propagate

Many citrus plants are started from seed; however, if grown in containers, these seedlings may never form flowers and fruit. The time from seed to fruit in the field may be 7 to 8 years -- a lot of time to devote to trees that may not have quality fruit. For this reason, most citrus plants are started from cuttings or grafted onto a seedling trifoliate orange understock.

Citrus plants may be grafted using the "T" bud, the inverted "'T" bud, and the cleft graft methods. This may be done in the fall or the spring. Budding is best done when the bark is slipping.

Control Pests and Diseases

Citrus may be attacked by many pests, including the whitefly, the orangedog caterpillar, and spider mites.

Disease problems include scab, melanose, and sooty mold. A regular spray program is recommended to reduce the chances of these pests becoming severe problems.

Harvest

Citrus fruits mature at various times of the year. Varieties of oranges and mandarins may ripen in October and November of the year in which they flowered. Late varieties may fruit in February and March of the year following flowering. It is not uncommon to have flowers, immature fruit, and ripe fruit on the plant at the same time.

The only sure way to determine maturity is to taste the fruit, because color is a poor indication of maturity, since many citrus fruits become sweet months after the rinds have developed color. Lemons and limes are exceptions. Since these are grown for their acid flavor, harvest any time the fruit reaches a usable size and juice content is adequate.

Once mature, many citrus fruits may be stored on the tree for several weeks and picked when needed. Mandarins are an exception. Mandarin fruit does not store well on the tree. Most citrus can be stored in the refrigerator for several weeks. If left at room temperature, the fruit may develop an off-flavor, wither, and become unattractive after about a week.

Citrus-Related Fruit

The kumquat (Fortunella species) is related to citrus. Some have been used in breeding programs to develop fruit such as the limequat, orangequat, and citrangequat.

Kumquats are more cold hardy than citrus, being able to withstand temperatures as low as 18°F. Kumquats may be used as garnishes or made into marmalade. Those with a high sugar content may be eaten fresh. To eat, roll and squeeze the fruit between your fingers to combine the sweet flavors of the skin with the tart flavors of the pulp. Nagami and Meiwa are varieties of kumquat.

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