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Citrus Fruits for Southern and Coastal Georgia

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Table of Contents

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Citrus Fruits for Southern and Coastal Georgia

Citrus plants are very versatile around the home and may be used as individual specimens, hedges or container plants. Their natural beauty and ripe fruits make them attractive additions to the South Georgia home scene. Cold-hardy varieties that receive recommended care may grow successfully in the coastal and extreme southern areas of the state (and to a lesser degree in more northern locations). Areas where citrus are best adapted within the state are shown in Figure 1.

The most significant limiting factor to citrus culture in these areas is damage from severe winter temperature. The following brief history of citrus culture in the United States vividly illustrates the devastating effect of winter freezes.

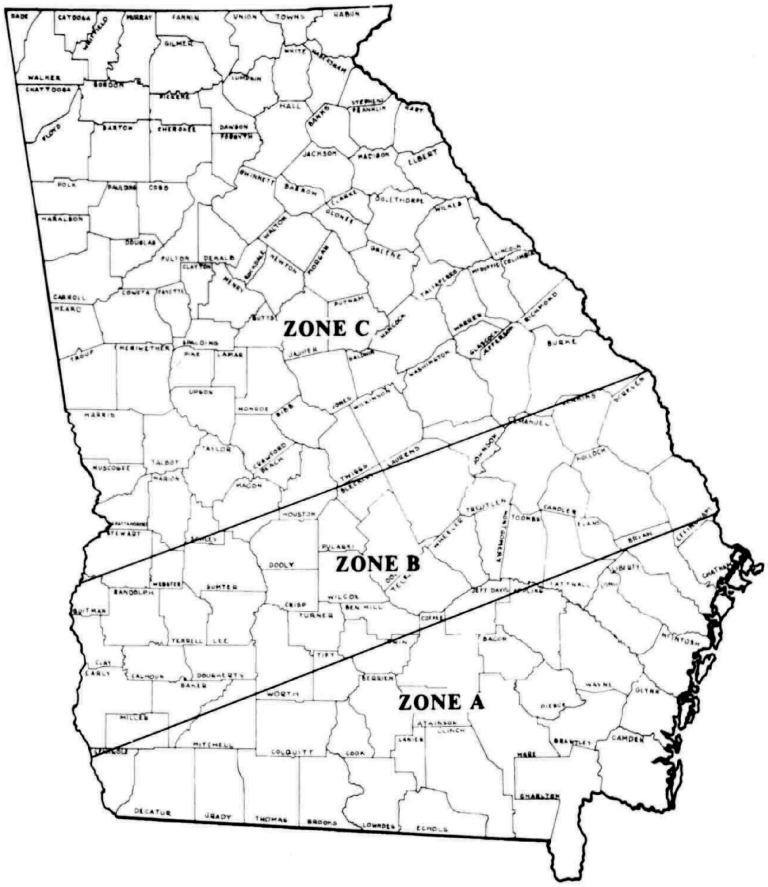

Figure 1: Citrus is best adapted to Zone A. With adequate cold protection, cold hardy selections may be grown in Zone B with some success. Citrus can be grown in lower Zone C, but extensive cold protection measures will be needed in some years.

Historical Background of Citrus in the U.S.

Citrus was first introduced into the continental United States by early Spanish explorers at Saint Augustine, Florida, in 1565. Considerable time elapsed before citrus was introduced into Arizona (1707) and California (1769).

History indicates that citrus plants have been grown for many years in gardens near the Gulf of Mexico and even as far north as Charleston, South Carolina. Small satsuma plantings were developed in the Gulf states as early as the 1890s but were destroyed by the freezes of 1894-95 and 1899. Plantings resumed until the freeze of 1916-17 struck, killing thousands of acres. By the early 1940s the hardy satsuma had again made a comeback, with some 12,000 acres growing in the Gulf states of Louisiana, Alabama and northern Florida. But freezes in the two decades following World War II mostly eliminated these plantings. Currently the main commercial areas are on the Gulf Coast of Louisiana and Florida.

Selecting Varieties

Sweet Types of Citrus

The three general classes of citrus that produce sweet fruits are mandarins, sweet oranges and grapefruit. All of these citrus types develop into attractive, medium- to large-size trees. However, some are better adapted to South Georgia conditions than others.

Mandarins

This citrus class includes a large group of loose-skinned, deeply-colored, highly-flavored fruits. They are sometimes referred to as the kid-glove (easily peeled) fruits. Within this group are the mandarins, satsumas, tangerines and tangerine hybrids. The terms mandarin and tangerine are used interchangeably for a number of loose-skinned fruits, depending upon where they are grown. For example **Dancy** is called a tangerine in Florida and a mandarin in California. Unlike other types of citrus, crosspollination is required for optimum fruiting of a number of tangerine varieties and hybrids.

Satsuma - The highest degree of success and greatest satisfaction in growing citrus in Georgia will be realized with the satsuma. It will withstand colder temperatures, produce more consistent crops over a longer period of time and requires less cold protection than other types of sweet citrus.

The satsuma is distinctly different from the mandarin. It is self-fruitful, has excellent cold hardiness and ripens its fruit well ahead of any freeze problems (September to November). **Owari** is the most popular variety, and is generally available at retail outlets. Fruits retain their peak quality for about two weeks, after which they may become puffy, rough in appearance and lose flavor and juice content. **Silverhill** is another good variety. **Changsha** is seed-propagated. Some have good flavor, but most are very seedy.

An important fact to remember when growing satsumas is that fruits become fully ripened for eating while the peel color is still rather green. Certain fruits will ripen ahead of others, but by beginning to harvest when the first few fruits become ripe, at least one to two weeks may be added to the length of the harvesting period.

Tangerines (Mandarin) - The next best type of citrus to plant from the standpoint of cropping and cold hardiness is the tangerine. Satsumas and tangerines will escape damage from many freezes that will severely damage grapefruit and sweet oranges.

Dancy and **Ponkan** are exceptionally good tangerine varieties that produce quality fruits. However, their fruits may not develop good flavor before early- to mid-December, so they may be exposed to freezing temperatures before attaining optimum ripeness. The Ponkan reportedly is less cold-resistant than most mandarins. Its fruits lose quality and the rind puffs if it is not picked when ripe. Earlier-ripening selections such as the **Clementine (Algerian)** tangerine should be planted where possible. Dancy and Ponkan are self-fruitful, but Clementine requires cross-pollination from another tangerine or tangerine hybrid. The tangerine hybrids described below provide some exceptionally good early-maturing varieties that should be of interest to the homeowner.

Tangerine Hybrids - Tangelos are tangerine-grapefruit hybrids that produce loose-skinned, tangerine-like fruits. **Orlando** is an ideal selection for homeowner use. It is cold hardy and produces excellent quality fruits that ripen early (October to December). Dancy, Clementine or some other variety should be planted with Orlando for cross-pollination. Other early-season (October to November) tangerine hybrids that could be grown include **Lee, Robinson, Osceola, Nova** and **Page.** All of these hybrids require cross-pollination for best fruiting.

Sweet Oranges

Sweet oranges may be grown along the lower coastal area with a fair degree of success if adequate cold protection is provided each year. **Hamlin** is suggested if fruits are desired primarily for juice. Its cold-hardiness is equal or superior to other sweet orange varieties; however, hard freezes (20 degrees F and lower) will severely damage them. Fruits are commercially seedless (six seeds or fewer per fruit) and ripen early (October to November). **Ambersweet** is another sweet orange suggested for trial.

The naval orange is recommended for growing seedless fruit that will be eaten fresh. Navel oranges often produce light crops and aren't usually as fruitful as sweet orange varieties (non-navel types) such as Hamlin. Suggested varieties include **Washington, Dream** and **Summerfield.** All ripen their fruits relatively early (October to December).

Grapefruit

Because of a lack of outstanding cold hardiness, grapefruit should be grown along the same lower coastal area as sweet oranges. Although numerous selections are available, the **Marsh** (white seedless) and **Redblush** or **Ruby** (red seedless) varieties are the most frequently planted. Both produce excellent quality fruit and have few to no seeds. (For those homeowners who prefer exceptionally high fruit quality, the white seedy varieties **Royal** and **Triumph** are suggested.) Marsh and Ruby fruits may be harvested as early as late September and October, but their quality significantly improves if they remain on trees until November and December. The **Star Ruby,** released by Texas A&M University, is an outstanding red, seedless grapefruit.

Acid Types of Citrus

There are a number of hardy acid-type fruits available for homeowner use. These plants make attractive ornamental specimens and provide delightful fruits. All are self-fruitful and do not require cross-pollination.

Kumquats

Kumquats are the most cold hardy of the commonly grown acid citrus fruits, tolerating temperatures as low as 15 to 17 degrees F. They possess a delayed resumation of growth in the spring, which helps avoid late freeze damage. The kumquat is one of the most widely used citrus plants around the home and develops into an attractive shrub-like tree that bears small orange-like fruit about one inch in diameter. Fruits may be eaten fresh, peel and all, or used in making jellies, marmalade and candies. Several varieties are available, but only three are commonly propagated: **Nagami, Marumi** and **Meiwa.** Nagami fruit are oblong to pear-shaped and have acid pulp; the others are sweeter and rounder. Meiwa, which produces nearly-round, sweet fruit, has become one of the most popular for home planting.

Calamondins

This small, round fruit looks somewhat like a tangerine and has very acid pulp. It is attractive as an indoor or container plant. Fruits are yellow to orange colored, and are readily used as a substitute for limes and lemons. Calamondins have good cold hardiness (low 20s).

Lemons

Meyer, one of the most cold-hardy lemon selections, is recommended for home planting because it produces good crops of large, practically seedless, juicy lemons. The fruit ripening period usually lasts for several months, beginning in late summer. Plants developed from cuttings are often used around the home. Inherent cold hardiness approximates that of the sweet orange (mid 20s).

Lime Hybrids

The **Eustis** limequat is a very cold-hardy lime-kumquat hybrid and makes a very attractive small plant. It is popular as a container plant. Limequats produce fruit resembling the lime in appearance and quality and may serve as an excellent lime substitute. Cold hardiness is about equivalent to the tangerine (low 20s). **Lakeland** and **Tavares** are two less-popular varieties occasionally found in retail outlets.

Rootstock Selection

Proper rootstock selection is crucial. Trifoliate orange *(Poncirus trifoliata)* is a superior rootstock for satsumas, oranges, kumquats and tangerines and is strongly recommended. It induces good cold hardiness in the scion variety and results in favorable yields and high fruit quality. About the only other rootstocks of value are sour orange, **Cleopatra** mandarin and certain citranges (a cross of sweet orange and trifoliate orange) such as **Rusk** and Carrizon. Cleopatra mandarin is an outstanding rootstock for mandarins-tangerines. Sour orange is incompatible as a rootstock for kumquats.

Pollination

With the exception of **Clementine** tangerine and certain tangerine hybrids such as **Orlando** tangelo, citrus trees are self-fruitful and do not require cross-pollination. Self-fruitful types of citrus may be grown as single trees.

Establishment and Care of Young Citrus

Site Selection and Spacing

Citrus trees produce fruit best when grown in full sun. Citrus trees planted under live oaks or pines produce only light fruit crops, but often survive freezes since warmer air may be trapped under the sheltering trees.

Avoid planting trees near septic tanks or drain fields. Tree roots may clog the drain, and soaps and cleaning supplies, used in the home may prove toxic to the trees.

Citrus trees do best on well-drained sandy loam soils, but will grow on many soil types if good water drainage is provided. If drainage is problem, plant on wide raised beds. Citrus plants that develop into trees, such as satsumas and tangerines, may be planted as close as 10 to 15, feet apart although a spacing of 15 to 20 feet is ideal. Small citrus plants such as kumquats may be spaced as close as six to 10 feet.

If possible, locate citrus plants in a protected area, such as near a home or some other structure, preferably on the south side. This type of location provides maximum protection from severe freezes. Usually the wind associated with South Georgia cold weather comes from the north to northwest.

Tree Selection and Planting Procedures

Most citrus trees for home plantings are purchased in containers, or balled and wrapped in burlap. Healthy one-year-old budded trees should be ½- to ¾-inch in caliper and two-year old trees usually measure ¾- to 1¼-inches in caliper (caliper is trunk diameter measured one inch above bud union). These trees are the ideal size for home planting. Acid-type fruit plants are usually purchased in smaller sizes. Planting can be done any time during the year, although late winter to early spring (after danger of freezing temperatures has passed) is ideal. A planting site four to five feet in diameter should be cleaned of all weeds and grasses and the soil thoroughly spaded.

Dig a hole large enough to accommodate the root ball. Remove the plant from the container and place it in the hole, keeping the top of the root ball level with the soil surface. If the tree is pot-bound, make vertical cuts at several locations around the ball to stimulate new root development. Fill the hole about one-half full with soil, add water and tramp firmly to settle soil and remove air pockets. Allow the water to settle, finish filling the hole with soil and apply water again. Pack the soil firmly around the trunk, adding additional soil if needed. Do not apply any fertilizer in the planting hole, as root damage may result. Around the tree, construct a water basin 30 to 36 inches in diameter and four inches high. Water twice weekly for the first two weeks unless rainfall is adequate. Gradually reduce the number of waterings to once weekly during periods of little or no rainfall.

The first growing season is critical in the life of a citrus plant. Water is essential. Keep an area at least four feet in diameter beneath the tree free of weeds and lawn grass to minimize competition for nutrients and water. If dense lawn grass is allowed to re-establish close to the tree trunk, the small tree will grow rather slowly because of intense competition.

At the time of planting, the branches should be cut back to six- to 12-inch stubs (this pruning is sometimes already completed when plants are purchased). This practice helps balance the top of the tree with the functional root system and stimulates vigorous regrowth. Very little pruning should be required during the first growing season except to remove sprouts that arise below the scaffold limbs (the primary structural branches originating from the tree trunk).

Ideally, scaffold branches should not be allowed to develop lower than 18 to 20 inches from the soil. The natural branching habit of citrus results in structurally sound trees; thus, the type of tree training normally practiced with peaches and apples is unnecessary.

Fertilization

Newly-planted trees should not be fertilized until growth begins in the spring. If possible, use a complete fertilizer such as an 8-8-8 or 10-10-10, which contains micronutrients. A suggested fertilizer schedule for the first three years is given in Table 1. Fertilizer applications should not be made between August 1 and February 15 during the first two years to avoid inducing untimely growth flushes during the winter.

During the first year, spread fertilizer in a 30-inch circle, and avoid placing any against the trunk. In subsequent years the fertilized area should be gradually increased. A good rule of thumb is to fertilize an area twice the diameter of the tree canopy.

Ordinary lawn and shrub fertilizer may be used for citrus trees; however, it fertilizer may only contain the primary plant food elements nitrogen, phosphorus and potassium. For the best performance, apply a fertilizer containing the secondary and micronutrients (magnesium, manganese and copper). The latter two elements, plus zinc and boron as needed, may also be supplied through nutritional sprays. Some garden centers and nurseries sell special citrus fertilizers that incorporate micronutrients.

TABLE 1. Suggested Fertilizer Schedule for Young Citrus Trees*

	(Lbs. of 8-8-8 fertilizer per tree)			
Growing Season	**March 1**	**April 15-30**	**June 1-15**	**July 15-30**
First	1/3**	½	2/3	1
Second	1	1 1/4	1 ½	1 3/4
Third	1 3/4	2	2 ½	3

*This schedule is designed for citrus plants that develop into medium to large trees. Only half these amounts, or less, will be needed for small, shrubby citrus plants such as kumquats, limequats, calamondins, etc.

**Make this application after growth begins in the spring, usually four to six weeks after planting.

Cold Protection

Even the most cold-hardy young citrus trees cannot withstand freezing temperatures as well as more mature, bearing trees. Before the first freeze, trees up to four years of age should be banked with clean soil to a height of about 15 inches. Soil banks should be removed after the last chance of freeze in the early spring. Wrapping material with good insulating properties such as fiberglass or foam rubber also make effective protectors and may be used in lieu of soil banks. These materials should be a minimum of six inches thick and must make good contact with the soil. Special microsprinklers can also be used to protect the trunks during freezes. When the trees grow larger, the microsprinkler is placed in the lower part of the in the tree to protect the trunk and lower scaffold limbs.

When only a few plants are involved, protective covers may be used when severe freezes occur. On extremely cold nights, placing one or two electric light bulbs beneath the cover provides good protection.

Sprinkler irrigation can also be used to protect citrus during some freezes. Start applying ¼-inch of water per hour when temperatures drop below freezing and continue until temperatures rise above 32 degrees F. If possible, support weak limbs to prevent breakage from ice. The ice should be clear and icicles should be present. If the ice is milky white, increase the volume of water being applied. See www.smallfruits.org for a chart to determine if overhead irrigation can be used for freeze protection.

Cold Hardiness and Factors Affecting Freeze Damage

Citrons, lemons and limes are most easily killed by freezing temperatures. Temperatures from the mid- to high-20s will readily kill or severely damage these plants. Sweet oranges and grapefruit are somewhat more cold hardy and usually require temperatures in the low- to mid-20s before incurring major damage to large branches. Tangerines and mandarins are quite cold hardy, usually withstanding temperatures in the low 20s before significant wood damage occurs. Among the edible types of sweet citrus, the satsuma has the greatest degree of cold hardiness. Properly hardened bearing trees will withstand temperatures as low as 19 to 20 degrees F without appreciable wood damage.

Citrus fruits, on the other hand, easily freeze at 26 to 28 degrees F, especially when these temperatures last for several hours. A longer duration of freezing temperatures is required to freeze grapefruit than sweet oranges, and tangerines and satsuma fruits are more easily frozen than either of the former.

The particular temperature at which tissue of a given plant will freeze and the degree of the damage sustained are functions of a number of factors in addition to the species and variety involved:

- the freezing temperature reached;
- the duration of the minimal temperature;
- how well the plant became hardened or conditioned before freezing temperatures occurred (the tissue freezing point of a hardened citrus plant may be five to six degrees lower than an unhardened plant);
- whether the plant is wet or dry (the killing temperature is two to four degrees lower for a dry citrus plant); and
- the age of the plant (a young plant cannot withstand as much cold as a more mature tree).

Some years, citrus plants seem to freeze at higher temperatures. The contributing factor seems to be the difference between air (ambient) temperature and leaf (tissue) temperature. On a windy night with clear or cloudy skies, leaf temperature will be approximately the same as air temperature. On a cold, clear night with little or no wind movement, leaf temperature may easily drop 3 to 4 degrees F below air temperature because of radiation heat loss. Thus, under the latter circumstances, while the minimum air temperature on a given night may have only been 25 degrees F, actual leaf temperature may have reached 21 to 22 degrees F. The critical temperature is that of the leaf or fruit, not the air.

Care of the Bearing Tree

The first three years should be devoted to developing a vigorous tree with strong scaffolds. Some fruit may be borne the second and third growing seasons, although the quality may not be too good. Trees should begin fruiting significant crops in the fourth growing season.

Continue using the same 8-8-8 fertilizer (or equivalent) for bearing trees. Three applications per year, in February, May or June and August or September, are suggested. Apply fertilizer from near the trunk to well beyond the leaf drip of the tree (on large trees this usually involves fertilizing about four to six feet beyond the leaf drip). A reasonable rate of application to maintain healthy foliage and good fruiting is about a half of a pound of the 8-8-8 fertilizer per year of tree age (rates are for sandy soils; clay and other soils with greater inherent fertility require less fertilizer). After a number of years, a fertilizer containing nitrogen and potassium or just nitrogen alone may prove adequate. A maximum of 1½ to 3 pounds actual nitrogen per tree per year should be adequate.

As trees age, problems may be encountered with micronutrient deficiencies. An annual nutritional spray applied in the spring usually corrects the deficiencies. Pre-packaged nutritional spray mixes may be purchased from garden supply dealers. These mixes should contain manganese, zinc and copper. Boron deficiencies may be corrected with foliar sprays or soil applications. When iron deficiency symptoms develop, chelated forms should be applied to the soil.

The pH (acidity or alkalinity) of the soil in which trees are growing should be maintained between 6.0 and 7.0. Apply dolomite, agricultural limestone or basic stag as needed to prevent the pH from dropping below 6.0. Your local county Extension agent or garden supply dealer can assist in determining if a pH adjustment is needed.

Weed control around large bearing trees becomes somewhat less essential. However, it is generally beneficial to remove all weeds and lawn grass from beneath the canopy of the tree. This approach also provides a more attractive landscape

design. Do remove weeds and grass from the area immediately around the tree trunk as this growth tends to create ideal conditions for fungal organisms such as those causing foot rot at the base of the tree. Mulches are not necessary for best tree performance, but may be used on well drained sites. Mulching material should not be placed within 12 inches of the trunk.

Watering bearing citrus plants will not be necessary in some years. However, adequate water should be provided as needed, particularly during flowering and fruit setting in early spring and the dry periods of mid- to late summer. A slow application of water over a several-hour period is preferable to a rapid "lawn-type irrigation."

Pruning citrus trees on an annual basis is unnecessary. Only remove water sprouts (suckers) and dead, damaged or diseased limbs. Make all cuts flush with the trunk or the next-largest branch (don't leave stubs). Seal all cuts in excess of ½-inch in diameter with a safe pruning paint—those with an asphalt base are recommended. The summer is usually an ideal time for pruning.

Citrus plants in Georgia are always subject to injury from cold weather. If trees are only slightly damaged, pruning may be done as soon as new growth indicates the extent of injury. However, regardless of the amount of injury sustained, no pruning should be done until after danger of further freezes has passed. If trees incur major freeze damage, allow the first flush of growth to mature before pruning.

Other Cultural Problems

Fruit Shedding

Homeowners frequently become concerned about the excessive shed of young blossoms and fruits in early spring. This is a natural shedding of blossoms and fruits that is characteristic of all citrus. Another natural fruit shedding occurs in May and June when fruits are marble-size. Keep in mind that only one or two percent (sometimes less than one percent) of the blossoms are needed for good crops. Natural shedding of flowers and fruits prevents citrus from overproducing.

Leaf Drop

Occasionally homeowners become alarmed when healthy trees lose large numbers of their leaves. In many cases this is a natural drop; and may be most noticeable in early spring. Citrus leaves live for 18 to 24 months and then begin shedding, with some leaf dropping occurring throughout the year. Always be alert to other possible causes of leaf shedding, including mite damage, excessive or insufficient soil moisture, cold damage or root diseases.

Fruit Splitting

In late summer (August to September), fruit splitting may be a problem with certain oranges and tangerines. This is a physiological problem that usually occurs when a period of fruit growth cessation (associated with moisture stress) is followed by a rapid increase in size as the result of a heavy rain. Other than alleviating moisture stress, little can be done about this problem.

Insect and Disease Control

Citrus fruits may be grown successfully in the home or backyard orchards with limited control of insects and diseases. Fruits produced without pesticide sprays may have very poor external quality as a result of mite, insect and fungus disease damage. The tree appearance may suffer, but they are seldom critically damaged by most citrus pests. Natural biological control will assist in maintaining pests at low population levels.

For those who prefer to spray, three cover sprays during each season are helpful. A post-bloom spray for scales, mites and fungal diseases, a summer oil for scales and mites, and a fall mite spray are usually satisfactory.

Formulating a spray program can be somewhat difficult because of the many factors involved, including constantly changing government regulations regarding the use of agricultural chemicals. Consult your local county Extension agent for information on developing a spray program for home citrus trees.

Learning for Life

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