

CITRUS FOR THE HOME GARDEN

August 2014

By Vincent Lazaneo

Horticulture Advisor Emeritus

Citrus are excellent trees for a home garden. They have shiny green foliage, fragrant white blossoms, and colorful, edible fruit. Citrus are evergreen trees that grow to a height of 6 to 30 feet depending on the variety and rootstock selected. Most varieties are self-fruitful and do not require another variety for cross-pollination.

Selecting Varieties

It's important to consider the climatic conditions of your area when you select citrus. Young trees can be injured or killed when winter temperatures drop below 29°F. Mature trees generally tolerate a few more degrees of cold than young trees. The cold hardiness of citrus trees varies from most tender to most hardy as follows: Mexican lime (28°F.), grapefruit, true lemon, tangelo, Tangor, Bearss lime, sweet orange, most Mandarin oranges, Meyer lemon, kumquat, and calamondin (20°F.). Fruit can also be damaged when temperatures drop below 29°F. Citrus varieties also differ in the amount of heat required to mature their fruit. Lemons and limes need the least amount of heat and will produce good fruit near the coast. Valencia oranges have a higher heat requirement. They produce good fruit in coastal and inland areas but are not adapted to the desert. Navel oranges require more heat and produce their best fruit in inland valleys. Mandarin oranges, tangelos, blood oranges, and grapefruit need even more heat to produce top quality fruit.

Root Stocks

Citrus varieties are grafted onto several rootstocks that vary in their resistance to certain soil diseases. Some rootstocks also have a dwarfing effect on the grafted variety. A standard navel orange can grow 30 feet tall and nearly as wide. The same variety grafted on trifoliolate orange rootstock will produce a mature tree 20 feet tall. Trees grafted on "Flying Dragon" rootstock will grow slowly and reach a height of about 6 to 8 feet.

Buying a Nursery Tree

Wholesale nurseries bud citrus varieties onto a selected rootstock and grow the trees for one or two years before they are sold. Young trees are preferred for planting because of their vigor and lower purchase price. Older trees, especially those that are root-bound, do not establish as quickly when they are planted. Healthy, vigorous trees should have leaves that are large with a uniform green color. A good one-year-old tree normally has leaves along the entire length of its trunk. The tree's bark should be bright and clean, and without wounds or other defects. The bud union (where the rootstock joins the scion) should be well healed and at least six inches above the ground.

The University of California prohibits discrimination against or harassment of any person on the basis of race, color, national origin, religion, sex, physical or mental disability, medical condition (cancer related or genetic characteristics), ancestry, marital status, age, sexual orientation, citizenship or status as a covered veteran (special disabled veteran, Vietnam-era veteran or any other veteran who served on active duty during a war or in campaign or expedition for which a campaign badge has been authorized.). University Policy is intended to be consistent with the provisions of applicable State and Federal laws. Inquiries regarding the University's policies may be directed to the Affirmative Action/Staff Personnel Services Director, University of California, Agriculture and Natural Resources, 300 Lakeside Drive, 6th Floor, Oakland, CA 94612-3550. Phone (510) 987-0096.

Where, When and How to Plant

Citrus trees should be planted where they will receive full sun most of the day. In areas that have cool summers, plant against a south-facing wall for extra heat. Citrus should not be planted in a lawn because the watering requirements of the two plants are not compatible. Grass also competes with the trees for nutrients. Citrus trees prefer well-drained loam or sandy loam soils, but with proper irrigation they can be grown in clayey soils. In poorly drained soils, plant above the level of the native soil in raised beds or on gently sloping mounds of soil.

Before you plant a tree, conduct a drainage test to find out how fast water drains through the soil. Dig a hole at least one foot deep and fill it with water. Wait for the water to drain out of the hole, then fill it with water again. All of the water should drain out of the hole by next day. If water stands in the hole for a day or longer, select another planting site or plant on a raised bed.

The best time of year to plant citrus is in the spring after the danger of frost has passed. Trees planted in the spring will have more time to grow and will withstand the cold weather of their first winter better than trees planted later in the year. Early planting is especially desirable in inland areas where hot summer weather can damage trees that are not well established.

Trees should be planted so the top of the root ball is about an inch above the level of the native soil. Gummosis, a fungus disease, often attacks the bark of trees that are planted too deep. Dig the planting hole just deep enough to accommodate the depth of the root ball and at least twice its diameter. The root ball will settle later if it is placed on loose soil, and this will damage the tree. Manure or soluble fertilizer should not be placed in the planting hole because it can injure roots. Be careful not to break the ball of soil that surrounds the roots when the tree is being planted. Check if the top of the root ball is at the correct height, then fill soil in around the root ball, and tamp it lightly.

After the tree is planted, create a watering basin by building a ridge of soil around the tree just beyond the root ball. Water the tree thoroughly several times so the soil will settle and make good contact with the root ball. A layer of coarse organic mulch can be placed on top of the soil to conserve water.

The sun's heat can damage the bark of young trees if it is not shaded by foliage. To protect trees from sunburn, paint the trunk with whitewash or a white, flat (not enamel) interior latex paint mixed with an equal amount of water. A commercial tree wrap will also protect the trunk from sunburn and rodent damage.

Care of Young Trees

Proper irrigation is the most important cultural practice to help young trees become established. Care must be taken to keep the soil moist but not waterlogged. The root ball of a newly planted tree must be kept moist to supply the tree with water until its roots grow into the native soil. During the first year, apply water at the tree's trunk so water will wet the root ball. Place one drip emitter on each side of the trunk or build an irrigation basin and fill with water. After the first year, water a larger area around the tree as it grows. If micro sprinklers are used, place a half-circle head on each side of the trunk and direct the spray away from the

trunk. Newly planted trees need to be watered every three to seven days, depending on weather conditions and soil type. Check the tree's root ball every few days, and water when the soil begins to dry out a few inches below the surface. After trees become established, water thoroughly but less often, (about every seven to fourteen days). On sandy soil or in hot weather, irrigation should be more frequent than on clay soil and in cool weather.

Trees should be fertilized lightly during the first year. Use a fertilizer containing nitrogen; a high concentration of phosphorus and potassium is not needed. During the first year, give trees ½ tablespoon of urea (46% nitrogen) or 1 tablespoon ammonium sulfate (21% nitrogen) monthly during the spring and summer. Ammonium sulfate has a very acidic reaction in soil and should not be used if soil is below pH 6.0, especially on decomposed granite (DG) or sandy soils. Scatter the fertilizer uniformly in the irrigation basin, then water thoroughly. After the first year, fertilize trees every four to six weeks beginning in February. Nitrogen fertilizer should not be applied after August since this stimulates new growth and makes trees more susceptible to frost injury. Citrus leafminer increases during warm weather and can severely damage new foliage if trees are given nitrogen fertilizer after June.

Increase the amount of fertilizer applied as trees grow larger. If you use a commercial fertilizer labeled for citrus, follow the manufacturer's directions for the amount to apply. If a fertilizer containing only nitrogen is used, use the chart below as a guide for the proper amount to apply. For dwarf trees (on Flying Dragon rootstock) use half the recommended amount of fertilizer. Nitrogen can be supplied with various fertilizers. The quantity of fertilizer needed will depend on the amount of nitrogen it contains.

<u>Year</u>	<u>Pounds of actual Nitrogen annually</u>	<u>Cups of Ammonium Sulfate per application*</u>	<u>Cups of Urea per application*</u>
2	0.2	0.5	0.25
3	0.4	1.0	0.5
4	0.7	2.0	1.0
5	1.0	2.5	1.25
10	1.5	4.0	2.0

*Make a total of four applications (four to six weeks apart) during spring and summer.

Scatter fertilizer evenly over the tree's entire root area which extends somewhat beyond the spread of the tree's branches. Do not place fertilizer in piles near the trunk, as this can severely damage the tree.

Maintaining a layer of loose organic mulch on the soil under citrus trees is beneficial. Apply a two or three inch deep layer of wood chips or compost under a tree and allow dead leaves to accumulate. Young trees should be pruned as little as possible. The removal of green leaves retards growth and increases the amount of time required for trees to begin to produce fruit. Keep mulch at least a foot away from the trunk of mature trees so the bark will remain dry. Young trees can be damaged by frost and should be protected during the first two or three winters. To do this, build a framework around the tree and cover it with a cloth tarp (plastic does not retain as much heat) when frost is predicted. For extra protection in cold areas the trunk can be wrapped with a four-inch thick sheet of fiberglass building insulation, or other suitable material.

Care of Mature Trees

Trees require moisture for growth and fruit production. In arid regions, trees must be irrigated periodically; however, excessive irrigation can exclude oxygen and cause root decay, especially if soil drainage is poor. Citrus roots normally extend well beyond the area covered by foliage. A circle 1-1/2 times the diameter of the tree's canopy will contain most of the roots. All of this area should be irrigated, with the exception of soil close to the tree's trunk, which should be kept dry to discourage bark diseases like Gummosis. Apply enough water at each irrigation to wet the soil three feet deep. This requires three to six inches of water depending on the type of soil. Water can be applied with sprinklers or by flooding a large basin. During dry weather, trees should be irrigated every two to six weeks depending on weather conditions and soil type. A layer of organic mulch will help retain soil moisture and permits feeder roots to grow close to the surface. Mulch should not be placed close to the trunk of a mature tree.

Mature citrus trees are given fertilizer to maintain their growth and fruit production. Nitrogen is the chief nutrient required by citrus and should be applied each year. Smaller quantities of phosphorus and potassium are required. These nutrients are held in the soil much longer than nitrogen.

A mature citrus tree requires 1 to 1-1/2 pounds of actual nitrogen each year. To calculate the number of pounds of fertilizer to apply, divide the pounds of nitrogen desired by the percentage of nitrogen in a fertilizer product. For example, it would take about 2 pounds of urea (46% nitrogen) to supply 1 pound of actual nitrogen (1 pound of actual nitrogen desired divided by 46% nitrogen in urea, then multiply by 100). It would take about 5 pounds of ammonium sulfate (21% nitrogen) to supply one pound of actual nitrogen (1 pound of actual nitrogen desired divided by 21% nitrogen in ammonium sulfate, then multiply by 100). Split the amount of fertilizer into four lots. Apply the first lot in February and the remaining lots at four to six week intervals. Scatter the fertilizer evenly over the tree's entire root area except near the trunk, then irrigate thoroughly to dissolve the fertilizer and carry it into the root zone.

Slightly acidic soil (less than pH 7.0 to pH 6.0) is ideal for citrus because all of the essential plant nutrients are in a chemical form that roots can absorb. Soil that is too acidic (below pH 5.5) or too alkaline (above pH 7.5) limits the availability of certain nutrients and may cause nutrient deficiencies in citrus. When soil pH is too high, using a fertilizer that has an acid reaction in soil can help make the soil less alkaline. Urea has a slightly acidifying reaction in soil and will not change soil pH very quickly. Ammonium sulfate has a severely acidifying reaction in soil and will lower soil pH much faster. For this reason, ammonium sulfate should not be used if soil is below pH 6.0, especially on decomposed granite (DG) or sandy soil since these soils are more sensitive to acidifying chemicals.

Citrus may occasionally suffer from a deficiency of zinc or iron. When these nutrients are deficient, the tissue between leaf veins turns yellow, but the veins remain green, at least initially. Foliar sprays containing chelated zinc or iron can be used to correct these deficiencies. Iron deficiency can also be caused by excessively wet soil or by very alkaline soil (pH above 7).

Citrus is ready to harvest when the fruit has colored and is mature. The fruit of most varieties color in the fall, but may not be sweet enough to harvest for several months. Fruit should be

left on the tree until it attains a satisfactory sweetness. Navel oranges usually mature in late winter, Valencia oranges in mid-Summer, and Mandarins from early winter to spring, depending on variety. Grapefruit require at least 18 months to mature in coastal areas. Mature fruit should be carefully harvested. Any break in the rind will promote decay. Use sharp clippers to cut the stem close to the fruit. Fruit can be stored on the tree several weeks to several months, depending on variety, after it is mature. Fruit left on the tree too long will become overripe and can reduce the size of the following year's crop.

POPULAR CITRUS VARIETIES

ORANGE		
WASHINGTON NAVEL	Jan – May	Good to eat fresh. Easy to peel. Seedless
VALENCIA	May – Oct	Best for juice. Hard to peel. Few seeds
BLOOD ORANGE: MORO	Feb – May	Burgundy flesh. Juicy. Aromatic
MANDARIN		
CLEMENTINE	Feb – Apr	Few to many seeds. Juicy
DANCY	March – Apr	Seedy. Moderately juicy. Tangy
GOLD NUGGET	March – July	Juicy. Fair to peel. Seedless
SATSUMA	Dec – Apr	Seedless. Juicy. Mild
LEMON		
EUREKA	Almost all year	Few seeds. Acid
LISBON	Almost all year	Few seeds. Acid. More thorny than Eureka.
IMPROVED MEYER	Almost all year	Few to many seeds. Less acid than lemons. (Not a true lemon)
GRAPEFRUIT		
STAR RUBY	May – Oct	Needs less heat than Marsh. Few seeds. Pinkish flesh.
ORO BLANCO HYBRID	March – July	Few seeds. Juicy. Heavy membrane on segments. Good along the coast.
LIME		
BEARSS	Aug – March	Rind turn yellow when fruit ages
TANGELO		
MINNEOLA	Feb - Apr	Juicy. Tart
KUMQUAT		
MEIWA	Jan – Mar	Few seeds. Sweet rind
NAGAMI	Dec – Mar	Slightly tart rind

CITRUS PESTS AND PROBLEMS IN THE HOME GARDEN

PESTS that attack citrus include insects, mites, snails and rodents. Trees should be checked regularly to detect pests before serious injury occurs. Treatments for some common citrus pests are described below.

Biological Control

Naturally occurring predators and parasites control many insect pests of citrus. Gardeners can do several things to help beneficial insects. Trees should be washed off periodically with a forceful spray of water. Dust that accumulates on leaves dries out beneficial insects and makes it more difficult for them to find their prey. Trees should not be sprayed with insecticides that leave a toxic residue on the foliage unless severe pest injury would otherwise occur. Long lasting insecticides kill beneficial insects for days or weeks after trees are sprayed. Sprays containing insecticidal soap or horticultural oil kill pests by suffocation and are less harmful to beneficial insects. Ants should be kept off citrus trees because they drive off and kill beneficial insects.

Ants

Aphids, whiteflies, mealybugs, and soft scale insects feed on plant sap and excrete a sugary liquid called honeydew. Ants feed on deposits of honeydew and they protect pests from beneficial insects. Ants can be prevented from climbing up citrus trees by applying a sticky barrier like Tanglefoot around a tree's trunk. Tanglefoot may damage trees if it is applied directly to the bark. First wrap a strip of heavy paper or other protective material around the trunk and then apply Tanglefoot to the outside surface. Periodically check the sticky barrier and refresh it when needed. In order for the barrier to be effective branches must be pruned so that they do not touch the ground or other structures. Ants can also be controlled with toxic baits that they take back to their nest and feed to other ants in the colony. Baits take time to work and must be replaced periodically.

Aphids

Aphids are small insects with soft, pear-shaped bodies and long legs. Their color varies from green to black. They remove sap from succulent foliage and excrete honeydew. Young leaves that are injured become distorted as they grow. Older trees are not seriously injured. Heavy infestations may slow the growth of young trees. Dislodge aphids with a forceful spray of water, or spray with insecticidal soap or oil. Keep ants off trees.

Whiteflies

Adults are small insects with powdery white wings and bodies. Larvae feed on the undersides of leaves. They are immobile, with round and flattened scale-like bodies. Some whitefly larvae produce waxy filaments and have a cottony appearance. Larvae feed on plant sap and excrete honeydew. Heavy infestations cause leaves to yellow and drop prematurely. Beneficial insects usually control whiteflies if ants are kept off trees and foliage is washed periodically to remove dust. Spray with insecticidal soap or oil to reduce severe infestation.

Scale Insects

Scale are small insects which are covered by a shell one-eighth to one-quarter inch across. They are found on leaves, stems and fruit. Eggs are laid under a protective shell and hatch into mobile crawlers. After a few days, crawlers settle and insert their mouth parts into

the plant tissue. They produce a protective covering and remain in the same location for the rest of their lives. Scale insects feed on plant sap. Some species produce honeydew and some produce toxins that damage plant tissues. Heavy infestations stunt plants, cause leaf drop and branch die back. To control scale, apply horticultural oil. If soil is dry, irrigate a day or two before treatment. Crawlers can also be controlled with insecticidal soap, but several applications are required to control successive generations.

Mites

Mites are very tiny and difficult to see without magnification. They have piercing mouth parts and feed on plant sap. Spider mites cause leaves to yellow and drop prematurely. Citrus rust mites cause the skin of citrus fruit to dry out and discolor. Oranges turn brown to black. Lemons and grapefruit turn gray. Periodically washing foliage off with a forceful spray of water helps control spider mites. Apply sulfur to control rust mites.

Citrus Leafminer

Tiny moths lay eggs on new leaves less than ½ inch long. The larvae feed inside developing leaves and leave a whitish trail. Mature trees produce healthy foliage in spring and tolerate leaf damage later in the year. Growth of young trees (less than five years old) may be stunted (see IPM Pest Note on Citrus Leafminer at www.ipm.ucdavis.edu for more information).

Snails

The European garden snail may cause considerable damage to citrus. It feeds on both the foliage and fruit. A four-inch wide band of copper sheeting wrapped around a tree's trunk can keep snails from climbing up the trunk. Decollate snails are a natural predator. Bait containing iron phosphate is toxic to pest and beneficial snails.

Gophers

Pocket gophers can kill citrus trees. They feed on the bark below the soil surface, and the damage is not initially apparent. Keep gophers under control with traps or poison baits.

Splitting of Oranges

Navel oranges often split during the fall. The split usually starts at the navel end of the fruit, which is the weakest point of the rind. Valencia oranges may also split in some years. Studies indicate that changes in temperature and relative humidity are mainly responsible for fruit splitting. Damage to fruit can be reduced by maintaining adequate soil moisture.

Reference

For more information on Citrus Pests, see UC publication #3303, [IPM for Citrus](#).