

## Guava Growing in the Florida Home Landscape<sup>1</sup>

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**Scientific name:** *Psidium guajava* L.

**Common names:** guava, guajava, guayaba, jambu biji (Malay), bayabas (Philippino), trapaek sruk (Cambodian), farang, ma-kuai and ma-man (Thai) and oi (Vietnamese)

**Family:** Myrtaceae

**Related species:** Cattle (Strawberry) guava (*P. cattleianum*), Costa Rican Guava (*P. freidlichiana*), Brazilian guava (*P. guineense*), feijoa (*Feijoa sellowiana*), jambolan (*Syzygium jambolanum*), Malay apple (*S. malaccense*), Java apple (wax jambu; *S. samarangense*), water apple (*S. aqueum*), rose apple (*S. jambos*), Surinam cherry (*Eugenia uniflora*), Grumichama (*E. brasiliensis*), pitomba (*E. luschnathiana*), and jaboticaba (*Myciaria cauliflora*). Some of these species may be listed as invasive. For more information see: Fox, A.M., D.R. Gordon, J.A. Dusky, L. Tyson, and R.K. Stocker (2005) IFAS Assessment of the Status of Non-Native Plants in Florida Natural Areas [Cited from the Internet (6 Jan., 2006) from <http://plants.ifas.ufl.edu/assessment.html>].

**Origin:** Guava is indigenous to the American tropics.

**Distribution:** Guava has become naturalized in tropical and subtropical regions throughout the world. In the U.S. guava is grown commercially in Hawaii, Puerto Rico, and Florida.

**Invasive status:** Guava has been assessed by the IFAS Invasive Plants Working Group as invasive and not recommended by IFAS for planting in south Florida; guava may be planted in central Florida but should be managed to prevent escape. For more information see: Fox, A.M., D.R. Gordon, J.A. Dusky, L. Tyson, and R.K. Stocker (2005) IFAS Assessment of the Status of Non-Native Plants in Florida Natural Areas [Cited from the Internet (6 Jan., 2006) from <http://plants.ifas.ufl.edu/assessment.html>].

### Description

#### Tree

Small, single or multi-trunked trees to 20 ft (6.1 m) in height with a broad, spreading or upright canopy. Trees may be single or multi-trunked. The bark of the trunk is attractive with a mottled greenish-brown to light brown color.

1. This document is HS 4, one of a series of the Horticultural Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. First printed 1968, revised 1998 and 2005. Reviewed November 2009. Please visit the EDIS Web site at <http://edis.ifas.ufl.edu> or <http://fruitscapes.ifas.ufl.edu>
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**Table 1.** Guava varieties in Florida.

Variety	Flesh color	Flavor	Recommendation for home planting <sup>z</sup>
Supreme	White	Mild, sub-acid	N
Ruby	Red	Mild, sweet	N
Blight	Light pink	Tart, pleasant	N
Patillo	Pink	Subacid, mild flavor	Y
Homestead (Ruby x Supreme)	Pink	Sweet	Y
Webber x Supreme	White	Sweet	N
Hong Kong Pink	Pink	Sweet	Y
Webber	Yellow	Sweet	N
Crystal	White	Mildly sweet, eaten immature, crunchy texture	Y
Lotus	White	Mildly sweet, eaten immature, crunchy texture	Y
Asian White	White	Mildly sweet, eaten immature, crunchy texture	Y

<sup>z</sup>, Some varieties may be difficult to find in the nursery trade.

### Leaves

Leaves are opposite, oblong, 3 to 7 inches (7.6-18 cm) in length, with serrated margins and prominent veins on the lower side. Leaves are finely pubescent on the lower side, especially when young.

### Inflorescence (Flowers)

White, about 1 inch (2.54 cm) in diameter, borne singly or in small groups (cymes) in axils of leaves of recent growth. Self-pollination is possible but cross-pollination by insects results in higher yields.

### Fruit

A berry with few to many small brown seeds. Fruit shape ranges from round, ovoid to pear-shaped. Fruit weight ranges from 1 ounce to 48 ounces (28 g - 1.4 kg). The peel color ranges from green to yellow and flesh color may be white, yellow, pink or red. Fruit peel thickness may be thin or thick and depends upon cultivar. There is a wide range in flavor and aroma, ranging from sweet to highly acid and strong and penetrating aroma to mild and pleasant.

### Varieties

There are numerous varieties of guava from Latin America, India, Southeast Asia, Mexico, and the U.S. (Florida, Hawaii, Puerto Rico). There are two basic types grown in Florida, pink or red pulp

types consumed when ripe and white pulp types consumed when non-ripe (green or crispy) (Table 1).

Pink type available include 'Homestead' (Ruby x Supreme), 'Barbi Pink', 'Blight', 'Hong Kong Pink', and 'Patillo'. Green types include 'Crystal', 'Lotus', 'Supreme', and 'Webber'. Some less popular varieties may be hard to find in local nurseries.

### Climate

Guava trees are well adapted to warm subtropical to tropical climatic conditions. Ideal temperatures for growth and production range from 73° to 82°F (23-28 g). Temperatures below 60°F or drought cause growth to slow or cease.

**Cold stress:** Young guava trees may be killed by temperatures of 27° to 28°F (-3° to -2°C). Mature trees may withstand short periods of 25° to 26°F (-4° to -3°C) without much damage. However, temperatures below this may damage or kill stems, limb, and the trunk. Fortunately, cultivars propagated by air-layering may sprout from the ground and regrow; coming into fruit production 2 to 3 years later.

**Flood stress:** Guava is considered moderately tolerant of short durations (7 to 14 days) of continuously wet or flooded soil conditions. However, prolonged flooding may lead to fruit and

leaf drop, leaf chlorosis, stem dieback, and tree death.

Trees are generally more tolerant of flooding during cool weather.

**Drought stress:** Guava trees are tolerant of prolonged drought and stop active vegetative growth during this time. Immature (soft) wood and leaves may wilt and drought during fruit set and development may decrease fruit set and size, respectively. Drought stress is sometimes used alone or in conjunction with other cultural practices (e.g., pruning) to induce off-season flowering and fruit production.

**Wind stress:** In general, guava trees are tolerant of windy conditions. Dry, hot windy weather during leaf flushing may result in distorted and damaged leaves. Guava trees maintained at 6 to 10 ft (1.8-3.0 m) in height usually remain standing after hurricane force winds. Guava trees growing in constantly windy areas may take on a slanted appearance due to more growth on the leeward side of the tree.

**Salt stress:** Guava trees are moderately tolerant to saline soils and water however growth and fruit production decrease. Symptoms of salinity stress include marginal and tip browning of leaves, leaf drop, stem dieback, small fruit size and fruit drop.

## Propagation

Guava trees may be propagated by seed however they do not come true from seed and fruit production may not begin for 3 to 8 years. Commercially, cultivars are vegetatively propagated by air layering (marcottage), stem cuttings, grafting and budding. The best material for stem cutting propagation is recently matured terminal wood. Stem cuttings should be 6 to 8 inches long with 2 to 3 leaves. The cuttings should be placed in sterile media in a mist bed. Bottom heat (75° to 85°F: 24° to 29°C) and/or dipping cuttings in rooting hormone are beneficial. Veneer and cleft grafting and chip budding are more successful on young vigorous seedling rootstocks. Scion material should be from terminal stem growth which is still green and quadrangular.

## Production (Crop Yields)

Guava trees generally begin fruit production 3 to 4 years after planting and yields range from 50 to 80 lbs (23-36 kg) or more per tree per year. In Florida, guava may produce two crops per year; the main crop during summer followed by another smaller crop during early spring. However, through simple pruning techniques fruit may be produced nearly year-round.

## Spacing

Guava trees in the home landscape should be planted in full sun. Depending upon ultimate tree size, trees should be planted 15 to 25 ft (4.6-7.6 m) away from other trees and structures and power lines. Trees planted too close to other trees or structures may not grow normally or produce much fruit due to shading.

## Soils

Guava trees are well adapted to a wide range of soil types including sands, loams, rock-based soils, and muck. A soil pH of 4.5 to 7 is ideal but plants do well in high pH soils (7-8.5) if supplied with chelated iron materials. Guava trees produced by air-layering or cuttings generally have a shallow root system with most roots within 12 to 18 inches (30-45 cm) of the soil surface.

## Planting a Guava Tree

Properly planting a guava tree is one of the most important steps in successfully establishing and growing a strong, productive tree. The first step is to choose a healthy nursery tree. Commonly, nursery guava trees are grown in 3 gallon containers and trees stand 2 to 4 ft (0.6-1.2 m) from the soil media. Large trees in smaller containers should be avoided as the root system may be "root bound". This means all the available space in the container has been filled with roots to the point that the root system is compacted in the container. Root bound root systems may not grow properly once planted in the ground.

Inspect the tree for insect pests and diseases and inspect the trunk of the tree for wounds and constrictions. Select a healthy tree and water it regularly in preparation for planting in the ground.

### Site Selection

In general, guava trees should be planted in full sun for best growth and fruit production. Select a part of the landscape away from other trees, buildings and structures, and power lines. Remember guava trees can grow to 20 ft (6.1 m) in height if not pruned to contain their size. Select the warmest area of the landscape that does not flood (or remain wet) after typical summer rainfall events.

### Planting in Sandy Soil

Many areas in Florida have sandy soil. Remove a 3 to 10 ft (0.9-3.4 m) diameter ring of grass sod. Dig a hole 3 to 4 times the diameter and 3 times as deep as the container the guava tree has come in. Making a large hole loosens the soil adjacent to the new tree making it easy for the roots to expand into the adjacent soil. It is not necessary to apply fertilizer, topsoil, or compost to the hole. In fact, placing topsoil or compost in the hole first and then planting on top of it is not desirable. If you wish to add topsoil or compost to the native soil, mix it with the soil excavated from making the hole in no more than a 1:1 ratio.

Backfill the hole with some of the native soil removed to make the hole. Remove the tree from the container and place it in the hole so that the top of the soil media in the container is level with or slightly above the surrounding soil level. Fill soil in around the tree roots and tamp slightly to remove air pockets. Immediately water the soil around the tree and tree roots. Staking the tree with a wooden or bamboo stake is optional. However, do not use wire or nylon rope to tie the tree to the stake as they may eventually damage the tree trunk as it grows. Use a cotton or natural fiber string that will degrade slowly.

### Planting on a Mound

Many areas in Florida are within 7 ft (2.1) or so of the water table and experience occasional flooding after heavy rainfall events. To improve plant survival consider planting fruit trees on a 2 to 3 ft (0.6-0.9) high by 4 to 10 ft (1.2-3.4 m) diameter mound of native soil.

After the mound is made, dig a hole 3 to 4 times the diameter and 3 times as deep as the container the guava tree has come in. In areas with sandy soil follow the recommendations from the section on planting in sandy soil.

## Care of Guava Trees in the Home Landscape

### Fertilizer

In Florida, young guava trees should be fertilized every 1 to 2 months during the first year, beginning with 1/4 lb (114 g) of fertilizer and increasing to 1 lb (455 g) per tree (Table 2 and Table 3). Thereafter, 3 or 4 applications per year in amounts proportionate to the increasing size of the tree are sufficient but, not to exceed 20 lbs per tree per year.

Fertilizer mixtures containing 6 to 10% nitrogen, 6 to 10% available phosphoric acid, 6 to 10% potash, and 4 to 6% magnesium give satisfactory results with young trees. For bearing trees potash should be increased to 9 to 15% and available phosphoric acid reduced to 2 to 4%. Examples of commonly available fertilizer mixes include 6-6-6-2 [6 (N)-6 ( $P_2O_5$ )-6 ( $K_2O$ )-2 (Mg)] and 8-3-9-2 [8 (N)-3 ( $P_2O_5$ )-6 ( $K_2O$ )-3 (Mg)].

From spring through summer, trees should receive 3 to 4 annual nutritional sprays of copper, zinc, manganese, and boron. Guava trees are susceptible to iron deficiency under alkaline and high pH soil conditions (e.g., rockland soils, calcareous sands). Iron deficiency can be prevented or corrected by periodic soil applications of iron chelates formulated for alkaline and high soil pH conditions. Guava trees growing in neutral to low pH soils (pH 4.5-7) may be fertilized 1 to 2 times per year with 1 to 3 lbs of iron sulfate spread under the tree canopy or soil drenched with chelated iron formulated for low pH soils.

### Irrigation (Watering)

Newly planted guava trees should be watered at planting and every other day for the first week or so and then 1 to 2 times a week for the first couple of months. During prolonged dry periods (e.g., 5 or more days of little to no rainfall) newly planted and

**Table 3.** Fertilizer program for guava trees in the home landscape.

Year	Times per year	Amount/tree/application (lbs) <sup>1</sup>	Total amount/tree/year (lbs) <sup>1</sup>	Nutritional sprays (times/year) <sup>2</sup>	Iron chelate drenches (oz/tree/year) <sup>3</sup>
1	4-6	0.25-0.5	1.5-3.0	4-6	0.5-0.75
2	4-6	0.5-1.0	3.0-6.0	4-6	0.75-1.0
3	4-6	1.0-1.5	6.0-9.0	4-6	1.0-1.5
4	4	1.5-2.5	9.0-10.0	4-6	1.5-2
5	4	2.5-3.5	10.0-14.0	3-4	2-4
6	4	3.5-4.0	14.0-16.0	3-4	2-4
7	4	4.0-4.5	16.0-18.0	3-4	2-4
8+	4	4.5-5.0	18.0-20.0	3-4	2-4

1, Use 6-6-6-2, 8-3-9-3, or similar material.  
2, The nutritional spray should contain zinc, manganese, boron, molybdenum; it may also contain iron. Foliar sprays are most effective from April to September.  
3, Iron chelate soil drenches (iron plus water) will prevent iron deficiency; foliar iron sprays are generally not effective. Apply soil drench from June to September.

young guava trees (first year) should be well watered twice a week. Once the rainy season arrives, irrigation frequency may be reduced or stopped.

Once guava trees are 2 or more years old irrigation will be beneficial to plant growth and crop yields during prolonged dry periods (Table 2). The specific water requirements for mature trees have not been determined. However, as with other tree crops, the period from bloom and through fruit development is important and drought stress should be avoided at this time with periodic watering.

### Guava Trees and Lawn Care

Guava trees in the home landscape are susceptible to trunk injury caused by lawn mowers and weed eaters. Maintain a grass-free area 2 to 5 or more feet away from the trunk of the tree. Never hit the tree trunk with lawn mowing equipment and never use a weed eater near the tree trunk. Mechanical damage to the trunk of the tree will result in weakening the tree and if severe enough can cause the tree to dieback or die.

Roots of mature guava trees spread beyond the drip-line of the tree canopy and heavy fertilization of the lawn adjacent to guava trees is not recommended

and may reduce fruiting and or fruit quality. The use of lawn sprinkler systems on a timer may result in over watering and cause guava trees to decline. This is because too much water, too often is being applied which results in root rot.

### Mulch

Mulching guava trees in the home landscape helps retain soil moisture, reduces weed problems adjacent to the tree trunk, and improves the soil near the surface. Mulch with a 2 to 6 inch (5-15 cm) layer of bark, wood chips, or similar mulch material. Keep mulch 8 to 12 inches (20-30 cm) from the trunk.

### Insect Pests

Guava trees are attacked by a number of insect pests including the Caribbean fruit fly, guava whitefly, red-banded thrips, guava fruit moth, and scales.

**Caribbean fruit fly** (*Anastrepha suspensa*): The Caribbean fruit fly is the most important pest of guava in Florida. Fruit infested with fly larvae are usually unsuitable for eating. Covering the developing fruit when it reaches about 1 inch in diameter with a paper bag will prevent fruit fly

infestation. For more information and control measures, consult your county agricultural extension agent.

**Guava moth** (*Argyresthia eugeniella*): The larvae of this moth tunnel into the fruit making it inedible and feed on the leaves. Larvae have a whitish color with a black colored head. Covering the fruit with a paper bag and spraying approved biological control agents may decrease the damage caused by this pest. For more information and control measures, consult your county agricultural extension agent.

**Red-banded thrips** (*Selenothrips rubrocinctus*): Red-banded thrips attack guava leaves causing defoliation and attack fruit causing a browning (russetting) of the peel. Guava plants should be inspected for this pest during the summer and fall. For more information and control measures, consult your county agricultural extension agent.

**Guava whitefly** (*Metaleurodicus cardini*): Guava whitefly is greenish yellow with a whitish covering of wax; the wings are dusky with a dark spot near the center of each wing. Whitefly feed on guava leaves. For more information and control measures, consult your county agricultural extension agent.

Various scales may also attack guava leaves, stems, and fruit. When detected at damaging numbers control measure may be warranted. For more information and control measures, consult your county agricultural extension agent.

### Diseases

A number of diseases attack guava trees including anthracnose, red alga, and various leaf spots.

Red alga (alga spot) is caused by *Cephaleuros virescens*. Symptoms of leaf infestation are reddish to purplish-brown circular spots. Young fruit and stems are also attacked. Severe red alga infestation may result in leaf and fruit drop and loss of tree vigor. Pruning trees to open them to increased light and air movement will decrease the severity of this disease. Including copper in periodic nutritional sprays or

applying foliar copper once or twice during the summer usually controls this disease. For more information and control measures, consult your county agricultural extension agent.

**Anthracnose** (*Colletotrichum gloeosporioides*): This fungus attacks fruit, leaves, and young stems and may cause stem dieback and leaf drop. Symptoms on young leaves include large, irregular dead spots that may also show pinkish color (spore masses). Symptoms on fruit are circular brown to black spots that enlarge with time; a pinkish coloration may also be present. Pruning trees to open them to increased light and air movement will decrease the severity of this disease. Including copper in periodic nutritional sprays or applying foliar copper once or twice during the summer usually controls this disease. For more information and control measures, consult your county agricultural extension agent.

Various leaf spots may be caused by *Cercospora* and *Pseudocercospora* spp.). Symptoms are generally dark smokey patches on the lower leaf surface and leaf drop. Pruning trees to open them to increased light and air movement will decrease the severity of this disease. Including copper in periodic nutritional sprays or applying foliar copper once or twice during the summer usually controls this disease. For more information and control recommendations please contact your local county cooperative extension agent.

### Nematodes

Guava tree roots may be attacked by several types of nematodes (*Rotylenchulus reniformis*, *Radopholus similis*, *Hemicriconemoides mangiferae*, and *Meloidogyne incognita*, *M. arenaria*, *M. javanica*, and *M. hapla*). Nematodes are microscopic roundworms. Symptoms of nematode attack include loss of tree vigor (stunting), leaf wilting, leaf yellowing, leaf nutrient deficiency symptoms, stem dieback and tree death. Planting of guava trees in known areas with severe nematode problems should be avoided. Mulching and attention to fertilizer and watering may decrease the effects of nematode infestation.

## Pruning

**Young tree training.** Newly planted guava trees without lateral branches should be pruned at about 1 to 2 ft to induce lateral branching. During the first year 3 to 4 well distributed lateral branches should be selected and allowed to grow 24 to 36 inches and then tipped to induce further branching. New shoot formed from tipping should also be tipped after 24 to 36 inches length. Subsequently, vigorous water sprouts or ill-placed shoots should be removed.

**Bearing trees.** Trees that are bearing fruit may be kept small (3 to 6 ft high) through continuous selective pruning and tipping or allowed to grow into slightly larger trees (6 to 12 ft). However, guava trees should not be allowed to grow higher than 12 ft because toppling over due to strong winds is increased. Regardless of the tree size desired, selective pruning may maintain trees at the desired height and spread and open the canopy to wind movement and sunlight penetration.

**Off-season fruit production.** Pruning may be used to induce off-season flowering and fruit production. Guava trees flower on new succulent, vigorous new growth arising from either lateral buds on older wood or at the ends of shoots. A period of 2-3 weeks without watering and then pruning will force new vegetative growth and flowering. Many times withholding water is not necessary.

## Harvest, Ripening, and Storage

Guava are picked based on their intended use. Pink or red guava for fresh fruit consumption are generally picked when the peel turns light green to yellow. Fruit are then placed at room temperature and allowed to ripen (soften) before consumption. White guava intended to be eaten fresh is usually picked when full-sized and green to light green and eaten before becoming ripe (yellow peel and soft). Both ripe and green guava may be stored in the refrigerator for 5 to 7 days before consumption.

## Uses

Guava may be eaten fresh, added to desserts such as ice cream, pastes, popsicles, pastries, and pies, pureed and juiced. Guava is an excellent source of Vitamin C (Table 4).

**Table 4.** Nutrient value of raw guava fruit (3.5 oz or 100 g of fruit).<sup>z</sup>

Constituent	Approximate value
Water content	81%
Calories	68 kcal
Protein	2.55 g
Fat	1 g
Cholesterol	0.0 mg
Carbohydrate	14.3 g
Total dietary fiber	5.4 g
Calcium	18 mg
Iron	0.26 mg
Magnesium	22 mg
Phosphorus	40 mg
Potassium	417 mg
Sodium	2 g
Vitamin C	228 mg
Vitamin A	624 IU

<sup>z</sup>, USDA National Nutrient Database for Standard Reference, Release 18 (2005). [Website: <http://www.nal.usda.gov/fnic/foodcomp/search/>] [Accessed, 10-31-2005].

**Table 2.** Cultural practices for producing guava in the home landscape.

Operation	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
General <sup>1</sup>		Apply NPK		Apply NPK			Apply NPK		Apply NPK			
Nutritional sprays <sup>2</sup>			Apply micronutrients		Apply micronutrients		Apply micronutrients		Apply micronutrients			
Iron applications <sup>3</sup>			Apply iron		Apply iron		Apply iron					
Watering	Water trees during dry periods, every 7 to 10 days and 1 time per week during flowering and fruit development.											
Insect control	Monitor for Caribbean fruit fly, mites, and moth larvae. Bag young fruit and monitor for leaf pests year-round.											
Disease control							Monitor for red alga and anthracnose. Apply copper along with nutritional sprays or apply alone once or twice especially during the wet season (May to October).					
Pruning <sup>4</sup>			Prune to reduce tree size and open up the canopy.						Prune to reduce tree size and open up the canopy.			
<p>1, NPK, nitrogen-phosphate-potash. Dry fertilizer mix which includes nitrogen, phosphate, potash, and magnesium. Apply fertilizer 1 time during early fruit development and at the end of harvest.</p> <p>2, Nutritional sprays are most effective during the warm parts of the year. See text for makeup of nutritional sprays.</p> <p>3, Iron applications are most effective during the warm parts of the year.</p> <p>4, Pruning may be done anytime during the year to control tree size and induce off-season fruit production. Severe pruning should be avoided during November through February to avoid possible damage due to freezing temperatures.</p>												