

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

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**Scientific Name:** *Pouteria campechiana*

**Common Names:** canistel, egg-fruit, ti-es, and yellow sapote (English), siguapa, zapotillo, zapote amarillo, and sapote mante (Spanish), tiesa (Philippino), lamut kahamen, khe maa, and to maa (Thai)

**Family:** Sapotaceae

**Relatives:** sapodilla, caimito (star apple), and mamey sapote

**Origin:** Southern Mexico, Belize, Guatemala, and El Salvador.

**Distribution:** Canistel has been distributed throughout Central America, the Caribbean, some regions of Southeast Asia, and areas of Africa.

**History:** Canistel was introduced into Florida early in the 20<sup>th</sup> century and is mostly grown in fruit collections and to a very limited extent commercially. Canistel is not common in home landscapes.

**Importance:** Canistel is not grown on a large commercial scale but is harvested and sold on a limited scale in the Philippines, Central America, and Florida.

### Description

#### Tree

Medium sized tree in Florida (20 to 25 ft; 6.1-7.6 m), but capable of being a large tree to 50+ ft (15 m) with an upright growth habit.

#### Leaves

The evergreen leaves are whorled at the ends of branches, obovate-elliptic, 2 to 10 inches (5-25 cm) long, tapering toward the ends.

#### Inflorescence (Flowers)

The bisexual flowers are borne in the leaf axils, singly or in clusters. Flowers are cream colored, have 5 sepals and 5 or 6 lobed petals (bell-shaped flowers), 5 stamens, and a single ovary.

#### Fruit

Fruit shape ranges from spindle-shaped to round to obovate; commonly with a pointed apex. Fruit range in size from 3 to 5 inches (8-13 cm) long and 2 to 3 inches (5-8 cm) in diameter. The peel is thin, waxy, smooth, green when immature and bright yellow to bright orange when ripe. The pulp is

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relatively firm, smooth, creamy, sweet, and also bright yellow to orange when ripe; the pulp of incompletely ripe fruit is dry and mealy. The pulp of ripe fruit may be dry to moist and mealy to smooth in texture. The fruit have 1 to 5 glossy brown seeds.

### Pollination

Canistel flowers are pollinated by insects.

### Varieties

There are a number of canistel varieties available in Florida. Most are of good quality, but fruit vary in size and shape (Table 1).

### Climate and Environmental Tolerance

Canistel grows best in tropical and warm subtropical climates at altitudes below 4,500 ft and with periodic rainfall.

**Cold:** Trees are only moderately cold tolerant, but young trees are damaged or killed at or below 29°F (-1.6°C) and mature trees at 23°F (-5°C).

**Flooding:** Canistel is considered moderately tolerant and may survive several days of excessively wet or flooded soil conditions; however, under those conditions tree growth and production decrease.

**Wind:** Trees appear to tolerate moderately windy conditions, and trees pruned to limit their size and allow for wind movement have survived hurricane-force winds without toppling.

**Drought:** Well-established canistel trees are tolerant of long periods of dry soil conditions, although a reduction in fruit size has been observed if this occurs during the period of fruit development.

### Propagation

Canistel may be propagated by seed, however, the seeds are short-lived and should be planted within a few days after extraction from the fruit; seeds may take 2 to 3 months to germinate. Seedling canistel begin to produce fruit in 3 to 6 years. Superior varieties must be propagated by grafting (side-veneer or cleft) or budding (patch) onto seedling rootstock.

Canistel may also be propagated by marcottage (air-layering), although this is not common.

### Production (Crop Yields)

Documentation of canistel fruit production is not available, however, observations suggest that well cared for mature trees produce 100 to 200 lbs (45-90 kgs) per year. In the subtropics and tropics where flowering may be induced by cool temperatures or a pronounced dry period, fruit is harvested during the late winter-early spring, whereas in the tropics, some fruit may be available year round.

### Spacing

Canistel trees should be planted in full sun but generally should be at least 25 to 30 ft (6.7-7.6 m) from adjacent trees and structures. Trees planted too close to other trees or structures may not grow normally or produce much fruit due to shading.

### Soils

Canistel trees are tolerant of most well drained soil types including acid and alkaline soils. Trees growing in fertile soils tend to produce larger but fewer fruit, whereas trees growing in infertile soils produce many but smaller fruit.

### Planting a Canistel Tree

Proper planting 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 canistel trees are grown in 3-gallon (11-liter) containers and trees stand 2 to 4 ft (0.6–0.9 meters) from the soil media. Large trees in smaller containers should be avoided because 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 tap root is growing along the edge of the container in a circular fashion. 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, canistel 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, canistel trees can become very large if not pruned to contain their size. Select the warmest area of the landscape that does not flood (or remain wet) after typical summer rains.

## Planting in Sandy Soil

Many areas in Florida have sandy soil. Remove a 3- to 10-ft-diameter (0.9- to 3.1-m) ring of grass sod. Dig a hole 3 to 4 times the diameter and 3 times as deep as the container the canistel tree came in. Making a large hole loosens the soil next 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 excavated soil in no more than a 50-50 ratio.

Backfill the hole with some of the excavated soil. Remove the tree from the container and place it in the hole so that the top of the soil media from 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. 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 because they may eventually damage the tree trunk as it grows. Use a cotton or natural fiber string that will degrade slowly.

## Planting in Rockland Soil

Many areas in Miami-Dade County have a very shallow soil and several inches below the soil surface is hard calcareous bedrock. Remove a 3- to 10-ft-diameter (0.9- to 3.1-m) ring of grass sod. Make a hole 3 to 4 times the diameter and 3 times as deep as the container the canistel tree came in. To dig a hole, use a pick and digging bar to break up the rock or contract with a company that has auguring equipment or a backhoe. Plant the tree as described for sandy soils.

## Planting on a Mound

Many areas in Florida are within 7 ft (2.1 m) or so of the water table and experience occasional flooding after heavy rains. To improve plant survival, consider planting fruit trees on a 2- to 3-ft-high by 4- to 10-ft-diameter (0.6- to 0.9-m by 1.2- to 3.1-m) 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 tree came in. In areas where the bedrock nearly comes to the surface (rockland soil) follow the recommendations for the previous section. In areas with sandy soil, follow the recommendations from the section on planting in sandy soil.

## Care of Canistel Trees in the Home Landscape

A calendar outlining the month-to-month cultural practices for canistel is shown in Table 2.

### Fertilizer

In Florida, young 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 (454 g) per tree (Table 3). Thereafter, 3 or 4 applications per year in amounts proportionate to the increasing size of the tree are sufficient, but do not 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 have been observed to 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<sub>2</sub>O<sub>5</sub>)-6 (K<sub>2</sub>O)-2 (Mg)] and 8-3-9-2 [8 (N)-3 (P<sub>2</sub>O<sub>5</sub>)-6 (K<sub>2</sub>O)-3 (Mg)].

From spring through summer, trees should receive 3 to 4 annual nutritional sprays of copper, zinc, manganese, and boron for the first 4 to 5 years. Canistel trees are susceptible to iron deficiency under alkaline and high-pH soil conditions. Iron deficiency can be prevented or corrected by periodic soil applications of iron chelates formulated for alkaline and high-soil-pH conditions. Periodic applications of ferrous (iron) sulfate may be made to trees growing in low-pH soils.

## Irrigation (Watering)

Newly planted canistel 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 young canistel trees (first 3 years) should be well watered twice a week. Once the rainy season arrives, irrigation may be reduced or stopped.

Once canistel trees are 4 or more years old irrigation will be beneficial to plant growth and crop yields during prolonged dry periods. 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.

## Canistel Trees and Lawn Care

Canistel 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 weakens the tree, and if severe enough, can cause dieback or kill the tree.

Roots of mature canistel trees spread beyond the drip-line of the tree canopy, and heavy fertilization of the lawn next to canistel trees is not recommended because it may reduce fruiting and or fruit quality. The use of lawn sprinkler systems on a timer may result in over watering and cause canistel trees to decline. This is because too much water too often applied causes root rot.

## Mulch

Mulching canistel trees in the home landscape helps retain soil moisture, reduces weed problems next to the tree trunk, and improves the soil near the surface. Mulch with a 2- to 6-inch (5- to 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

Canistel have few insect pests in Florida at the present time. These include scales and mealbugs. Contact your local county extension agent for current control recommendations for more information.

## Diseases

Several diseases attack canistel leaves, including scab and leaf-spot (*Elsinoe lepagei*), leaf-spot (*Phyllosticta* sp.), black leaf-spot (*Phyllachora* sp.), leaf necrosis (*Gloeosporium* sp.). Fruit may be attacked by anthracnose (*Colletotrichum gloeosporioides*) and rust (*Acrotelium lucumae*), and roots may be attacked by *Pythium* sp. Contact your local county extension agent for current control recommendations for more information.

## Pruning

Periodic pruning of canistel trees can easily maintain trees at or below 10 to 12 ft (3.1-3.7 m) in height. Young nursery trees should be planted and left to grow during their first season so that they establish quickly. However, during the early spring of the following year, trees should be cut back to either force branching along the main trunk and/or selective branches should be headed back and others cut out completely to encourage the formation of evenly spaced branches and wide branch-to-trunk crotch angles.

To maintain optimum fruit production and limit tree height, trees should be selectively pruned annually. To begin, the tree should be pruned at about 10 to 12 ft (3.1–3.7 m) in height by removing the primary (central) leader and secondary leaders and any vigorous upright limbs during the spring. Subsequently, the tree may be shaped by selectively pruning to form a cone-shaped canopy. Follow-up pruning should be done during late summer to remove any new, vigorous growth. Removing the central leader and periodically selectively removing vigorous growth will keep the canopy remain to light and wind movement. The goal is to maintain fruit production in the lower tree canopy, improve light penetration into the canopy, and limit tree size.

## **Harvest, Ripening, and Storage**

Canistel should be harvested when fruit turn yellow-orange. Allowing fruit 3 to 10 days to ripen at room temperature (76-82°F; 24-28°C). Ripe fruit are soft but not mushy. Harvest fruit carefully because the peel is very easily damaged. Once fruit is ripe it may be stored in the refrigerator for several days prior to use.

## **Uses and Nutritional Value**

Canistel may be eaten fresh, although it is more commonly used to make milkshakes, custards, or ice cream. Canistel is high in potassium and vitamins (Table 4).

**Table 1.** Canistel varieties in Florida.

Variety	Origin	Weight (oz)	Seed number	Season	Comments	Rec. <sup>z</sup>
Bruce	Florida	6-24	1-4	Aug.-Oct./Feb.-March	Dry flesh, fair eating quality, large fruit	M
Fairchild #1	Florida	4-13	1-7	Sept.-Oct.	Moist pulp, good eating quality, medium-large fruit	Y
Fairchild #2	Florida	2-9	1-4	Year-round	Moist pulp, good eating quality, small fruit, low production	N
Fitzpatrick	Florida	2-3	1-3	Sept.-Jan.	Greenish-yellow peel at maturity, moist pulp, productive, small fruit, good eating quality	Y
Keisau	Florida	7-11	1-4	Winter	Medium dry pulp, medium-large fruit	N
Oro	Florida	7-18	1-4	Sept.-Oct./Feb.-April	Moist pulp, large fruit, heavy producer, good eating quality	Y
Ross	Florida	3-6	1-3	Fall-winter	Greenish-yellow peel at maturity, moist pulp, small fruit, O.K. eating quality	N
Trompo	Florida	8-15	1-4	Sept./Oct./Feb.-May	Moist pulp, large fruit, heavy producer, good quality	Y
USDA 1	Florida	3-10	1-5	Fall-Winter	Dry and mealy pulp, large number of seeds	N

<sup>z</sup> Recommendation: Y, yes; N, no; M, maybe.

**Table 2.** Cultural calendar for mature canistel trees in Florida.

Operation	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
<b>General<sup>1</sup></b>	Apply NPK		Apply NPK		Apply NPK		Apply NPK				Apply NPK	
<b>Nutritional sprays<sup>2</sup></b>				Foliar applications during the warm season are more effective than during cool periods.								
<b>Iron applications</b>			Dry soil applications of ferrous (iron) sulfate to neutral and low-pH soils and liquid soil drench applications to high-pH soils are more effective during the warm season.									
<b>Watering</b>	Water trees during prolonged dry periods.								Reduce watering to slow or stop plant growth and enhance flowering.			
<b>Insect control</b>	Monitor for leaf and fruit diseases. Contact your local county extension agent for current control recommendations for more information.											
<b>Disease control</b>	Monitor for leaf and fruit diseases. Contact your local county extension agent for current control recommendations for more information.											
<b>Pruning</b>				Selectively prune trees after the harvest season.					Follow-up pruning			

<sup>1</sup> NPK, nitrogen-phosphorus-potassium; apply granular fertilizer 3-4 times per year. Reduce the amount of NPK application during late summer, early fall to slow plant growth in preparation for flowering in the late fall.

<sup>2</sup> Foliar nutritional spray materials should contain magnesium, manganese, zinc and possibly other micronutrients.

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

Year	Times per year	Amount/tree/application (lbs) <sup>1</sup>	Total amount/tree/year (lbs)	Nutritional sprays (times/year)	Iron chelate drenches (oz/tree/year) <sup>3</sup>
1	4-6	0.25-0.5	1.5-3.0	4-6	0.25-0.50
2	4-6	0.5-1.0	3.0-6.0	4-6	0.5-0.75
3	4-6	1.0-1.5	6.0-9.0	4-6	0.5-0.75
4	3-4	1.5-2.5	9.0-10.0	2-3	0.75-1.0
5	3-4	2.5-3.5	10.0-14.0	2-3	0.75-1.0
6	3-4	3.5-4.0	14.0-16.0	2-3	1.0-1.5
7	3-4	3.5-4.0	16.0-18.0	2-3	1.0-1.5
8+	2-3	4.5-5.0	18.0-20.0	2-3	1.5-2.0

<sup>1</sup> Use 6-6-6-2, 8-3-9-3, or a similar material.  
<sup>2</sup> The nutritional sprays should contain zinc, manganese, boron, molybdenum; it may also contain iron. Foliar sprays are more effective from April to September.  
<sup>3</sup> Iron chelated soil drenches (iron plus water) will prevent iron deficiency in high pH, calcareous soils; foliar iron sprays are generally not effective. Apply soil drenches from April through September.

**Table 4.** Nutritional value of canistel (100 g; 3.5 oz).<sup>2</sup>

Constituent	Value	Constituent	Value
Water	61%	Calcium	26.5 mg
Calories	139 kcal	Phosphorus	37.3 mg
Protein	1.7 g	Iron	0.9 mg
Fat	0.13 g	Carotene	0.32 mg
Carbohydrate	37 g	Niacin	3.7 mg
Fiber	0.1 g	Ascorbic acid	58 mg

<sup>2</sup> Morton, J. 1987. Fruits of Warm Climates. J.F. Morton, Miami, Fla. P.402-405.