

## **Black Sapote Growing in the Florida Home Landscape<sup>1</sup>**

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**Scientific Name:** *Diospyros digyna*

**Common Names:** black sapote and black persimmon (English), sapote negro, zapote prieto, and matasano de mico (Spanish)

**Family:** Ebenaceae

Relatives: persimmon, velvet apple

**Origin:** Mexico, Central America, and western South America

**Distribution:** Tropical and subtropical Latin America, the Philippines, Moluccas Islands, Sulawesi Island, and North America.

**History:** Black sapote was consumed by indigenous people in Mexico and Central America and distributed by the Spanish to the Caribbean and Asia.

**Importance:** Black sapote is not widely grown. It is usually consumed by local people who are familiar with the fruit.

### **Description**

#### **Tree**

Medium (25 to 30 ft; 7.6 to 9.1 m) to large trees (30 to 80 ft; 9.1 to 24.4 m) with an oblong canopy. In Florida, usually a medium sized tree. Black sapote is usually dioecious, meaning that some trees produce only male flowers and no fruit and other trees produce female or bisexual flowers and fruit. Some trees may produce both male and female (or bisexual) flowers on the same tree.

#### **Leaves**

Evergreen leaves are alternate, oblong, leathery, 4 to 12 inches (10–30 cm) long, glossy, and dark green.

#### **Inflorescence (Flowers)**

Flowers arise in leaf axils and may be either hermaphroditic (possessing male and female plant parts) or male. Some trees may produce only male flowers. Male flowers are usually in clusters of 3 to 7, and female flowers are usually solitary. Flowers are white and tubular, with a green calyx and an 8- to 12-carpelled ovary.

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## Fruit

Fruit are oblate to globose, 2 to 6 inches (5–15 cm) in diameter, with dark olive-green to bright green peel and a persistent green calyx. Immature fruit are hard with a yellowish-orange pulp, becoming very soft and turning brown to black when fully ripe. There may be 0 to 12 flat, smooth, brown seeds.

## Pollination

Flowers are pollinated by insects. Some varieties may be self-incompatible and therefore require cross pollination with another variety or seedling that produces male or bisexual flowers in order to produce fruit.

## Varieties

There are a few black sapote varieties available in Florida including 'Merida' (also called 'Reineke') and 'Bernicker'. There are a number of other varieties that are not available locally yet. These include 'Mossman', 'Cocktail', 'Maher', 'Ricks Late', and 'Superb'.

- 'Merida' ('Reineke') produces – fruit 2.5 to 4 inches (7-10 cm) in diameter, oblate, 7 to 16 oz; mean, 10 oz (190-440 g; mean 290 g), very sweet, good to excellent in quality, 5-10 seeds per fruit; season early to mid-Nov. to Jan., 132 to 165 lbs (60-120 kg) per tree.
- 'Mossman' – large fruit, few seeds.
- 'Bernicker' – few seeds, prolific.
- 'Cocktail' – excellent flavor
- 'Maher' – very large fruit, good quality
- 'Ricks Late' – from NSW Australia
- 'Seperb' – small fruit, nearly seedless.

## Climate

Black sapote trees are adapted to tropical and warm subtropical areas and may be planted from sea level to an altitude of about 6,000 ft. Trees are not cold tolerant with young trees damaged or killed at or below 30°F (-1°C) and mature trees at or below

28°F (-2°C). Black sapote is reported to be flood tolerant but only moderately drought tolerant. Trees appear to tolerate moderately windy areas, and if pruned regularly to limit tree size and open the canopy to wind movement can withstand hurricane-force winds without toppling.

## Propagation

Black sapote may be propagated by seed, marcottage (air-layering, budding, and grafting). Black sapote varieties do not come true from seed and seedling trees may take up to 5 or 6 years to flower. Trees with only male flowers will not produce fruit; trees with female or male and female flowers will bear fruit. Superior fruit varieties and selections are therefore propagated by budding and grafting.

## Production (Crop Yields)

No information is available on the typical crop yields. However, large trees may produce several hundred pounds per year. Harvest of black sapote varies and may be December through February or June through August.

## Spacing and Pruning

Planting distances depend on soil type and fertility, current technology, and expertise of the homeowner. Black sapote trees in the home landscape should be planted 25 to 30 feet or more (7.6 to 9.1 m) away from buildings and other trees. Trees planted too close to other trees or structures may not grow normally or produce much fruit as they grow older due to shading.

## Soils

Black sapote trees grow well in most well drained soil types including sands and limestone-based, high-pH soils.

## Planting a Black Sapote 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 black sapote trees are grown in 3-gallon (11-liter) containers and trees stand 2 to 4 ft (0.6–0.9 m) from

the surface of 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.

### Site Selection

In general, black sapote 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 black sapote 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 rainfall.

### Planting in Sandy Soil

Many areas in Florida have sandy soil. Remove a 3- to 10-ft-diameter (0.9- to 3.1-m) diameter ring of grass sod. Dig a hole 3 to 4 times the diameter and 3 times as deep as the container the black sapote 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 1:1 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 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 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 a hard, calcareous bedrock. Remove a 3- to 10-ft-diameter (0.9- to 3.1- m) diameter ring of grass sod. Make a hole 3 to 4 times the diameter and 3 times as deep as the container the black sapote 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 augering equipment or a backhoe. Plant the tree as described for sandy soils.

### Planting on a Mound

Many areas in Florida are within 7 ft or so of the water table and experience occasional flooding after heavy rains. To improve plant survival, consider planting fruit trees on a 3- to 4-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 Black Sapote Trees in the Home Landscape

A calendar outlining the suggested month-to-month cultural practices for black sapote is shown in Table 1.

### Fertilizer

Black sapote is not demanding in its fertilizer requirements. After planting, when new growth begins, apply 1/4 lb (113 g) of a young tree fertilizer such as a 6-6-6-2 (%nitrogen-% phosphate-% potash-% magnesium) with minor elements with 20 to 30% of the nitrogen from organic sources (Table 2). Repeat this every 6 to 8 weeks for the first year then gradually increase the amount of fertilizer to 0.5, 0.75, and 1.0 lb (227 g, 341 g, 454 g) as the tree grows. Use 4 to 6 minor element (nutritional) foliar sprays per year from April to September.

Black sapote trees generally do not develop iron deficiency, even when grown in the rocky, calcareous, high-pH soils of Miami-Dade County. If iron deficiency symptoms appear (chlorotic leaves with green veins) apply iron. For trees in acid to neutral soils apply dry iron sulfate at 0.25 to 1 oz (7-28 g) per tree to the soil 2 to 4 times per year; water the iron into the ground. In alkaline soils with a high pH, drench the soil next to the tree trunk with 2 to 4 oz. (57-113 g) of iron chelate 1 to 2 times per year from June through September.

For mature trees, 3.0 to 5.0 lbs (1.4-2.3 kg) of fertilizer per application 2 to 3 times per year is recommended. The fertilizer mix should also include phosphate ( $P_2O_5$ ) and potash ( $K_2O$ ); use a 6-6-6, 8-3-9 or similar material. Use 2 to 3 minor element (nutritional) foliar sprays per year from April to September.

### **Irrigation (Watering)**

Newly planted black sapote 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 black sapote trees (first 3 years) should be watered once a week. Once the rainy season arrives, irrigation may be reduced or stopped.

Once black sapote trees are 4 or more years old watering will be beneficial to plant growth and crop yields only during very prolonged dry periods during the year. Mature black sapote trees do not need frequent watering and over watering may cause trees to decline or be unthrifty.

### **Black Sapote Trees and Lawn Care**

Black sapote 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 (0.6-1.5 m) 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 weaken the tree and, if severe enough, can cause dieback or kill the tree.

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

### **Mulch**

Mulching black sapote 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 and Diseases**

At present there are no major insect pests and diseases of black sapote in Florida.

### **Pruning**

Formative pruning during the first 2 years may be desirable to encourage lateral branching and growth. After several years of production, it is desirable to cut back the tops of the trees to 12 to 15 feet (3.6 to 4.6 m). Selectively removing a few upper limbs back to their origins (crotches) each year will help prevent the loss of the lower tree canopy due to shading by the upper canopy. In addition, maintaining a smaller tree facilitates tree care and fruit harvest, makes it easier to spray the tree, and greatly reduces possible storm damage.

Pruning should be done soon after after danger of frost has passed. Severe pruning is sometimes used to reduce tree height or width of very large trees. Pruning does not injure black sapote trees, but may reduce fruit production for one to several seasons. Once black sapote trees become 30 ft tall (9.1 m) or taller extreme caution should be used in pruning the trees. Climbing trees to prune them is dangerous and not recommended. Pruning of large black sapote trees should be done by a professional arborist who is licensed and insured.

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

Mature black sapote fruit change from a shiny green to dull green color and the lobes of the sepals (called the calyx) reflex upward. Harvested fruit take 3 to 14 days to soften to eating quality. After fruit become ripe they may be stored in the refrigerator for several days for later use.

## **Uses and Nutritional Value**

Black sapote fruit are eaten when fully ripe and soft. The soft pulp may be eaten fresh or is commonly added as an ingredient of drinks, ice-cream, cakes, and milk-shakes. Black sapote is very high in vitamin C and a good source of calcium and phosphorus (Table 3).

**Table 1.** Cultural calendar for black sapote production of mature (bearing) trees in the home landscape.

Operation	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
<b>General NPK<sup>1</sup></b>				Apply NPK		Apply NPK			Apply NPK			
<b>Nutritional sprays<sup>2</sup></b>				Apply 2 to 3 foliar nutritional sprays during the warm period of the year.								
<b>Iron applications<sup>3</sup></b>				Apply iron during the warm period of the year.								
<b>Watering</b>	Water only during prolonged dry periods.										Water only during prolonged dry periods.	
<b>Insect control</b>	Monitor for insect infestations. Contact your local county extension agent for current control recommendations.											
<b>Disease control</b>	Monitor for disease infestations. Contact your local county extension agent for current control recommendations.											
<b>Pruning</b>			Selectively prune to limit tree size and open the canopy to wind movement.									
<sup>1</sup> NPK, nitrogen-phosphate-potash. Many formulations also contain magnesium (Mg). <sup>2</sup> Nutritional sprays should contain manganese, zinc, and other micronutrients. <sup>3</sup> Dry ferrous (iron) sulfate may be applied to trees growing in low-pH soils; use chelated iron soil drenches for trees growing in high-pH soils.												

**Table 2.** Suggested fertilizer recommendations for black sapote trees for Florida.

Year	Times per year	Amount/tree/ application (lbs) <sup>1</sup>	Total amount/tree/ year (lbs)	Minor element 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	2-3	1.5-2.5	9.0-10.0	2-3	1.5-2
5	2-3	2.5-3.5	10.0-14.0	2-3	2-4
6	2-3	3.5-4.0	14.0-16.0	2-3	2-4
7+	2-3	4.0-4.5	16.0-18.0	2-3	2-4
<sup>1</sup> Use 6-6-6, 8-3-9, or a young-tree or slow-release fertilizer. <sup>2</sup> The sprays should contain zinc, manganese, boron, molybdenum; they may also contain iron. Foliar sprays are most efficient from April to September. <sup>3</sup> Iron chelate soil drenches (iron plus water) will prevent iron deficiency; foliar sprays are generally not effective. Apply soil drenches from June to September.					

**Table 3.** Nutrient value of black sapote (100 g; 3.5 oz).<sup>z</sup>

<b>Constituent</b>	<b>Value</b>
Water	79.46-83.1 g
Protein	0.62-0.69 g
Carbohydrates	12.85-15.11 g
Fat	0.01 g
Ash	0.37-0.6 g
Calcium	22.0 mg
Phosphorus	23.0 mg
Iron	0.36 mg
Carotene	0.19 mg
Riboflavin	0.03 mg
Niacin	0.20 mg
Ascorbic acid	191.7 mg
<sup>z</sup> Morton, J. 1987. Fruits of Warm Climates. J. Morton Publ. p.418.	