

Mamey Sapote Growing in the Florida Home Landscape¹

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- **Scientific name:** *Pouteria sapota* (Jacq.) H.E. Moore & Stearn
- **Other common names:** sapote, mamey colorado
- **Synonyms:** *Calocarpum sapota* (Jacq.) Merr., *Calocarpum mammosum* (L.) Pierre
- **Family:** Sapotaceae
- **Relatives in same family:** sapodilla, satin leaf, caimito, canistel, abiu, green sapote.
- **Origin:** Mexico and the Central American lowlands
- **Distribution:** Mamey sapotes (Plate 1) have been grown or cultivated in Central America, Mexico, northern South America, and the West Indies for centuries. The first recorded introduction into southern Florida was during the mid-1880s.
- **Importance:** The mamey sapote is an important fruit in Miami-Dade, Florida (US), Mexico, Central America, and in the West

Indies--including the Dominican Republic, Puerto Rico, and Cuba. In the state of Florida, Cuban Americans and Central Americans have helped to establish a small but viable industry. Except for the Americas, this very attractive and excellent fruit is not well-known, probably because its short-lived seeds may have discouraged intercontinental transport in colonial times. Recently, there is increasing interest in this fruit in other countries (e.g., Australia, Israel, Philippines, Vietnam, Spain, Venezuela).

Description

Tree

The mamey sapote grows into an open tree with a thick central trunk and a few large limbs. Mamey sapote trees are large, erect to spreading trees which may grow to a height of about 40 feet (12.2 m) in Florida and may exceed 60 feet (18.3 m) in more tropical regions.

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Leaves

The leaves are large, up to 12 inches (30.5 cm) long and 4 inches (10.2 cm) wide, simple, and obovate to oblanceolate in shape. The underside is lighter green or brownish and pubescent (hairy) when young but becomes glabrous (smooth) when mature. The leaves are clustered at the ends of the small branches. Depending on the cultivar (variety) and recent crop load, trees will drop most of the leaves in late winter or spring, but develop new leaves rapidly.

Flowers

The small, perfect, whitish, almost sessile flowers are produced abundantly along small branches (1/2 to 2 inches; 1.3 to 5.1 cm), and tend to cluster towards the ends of the stems.

Fruit

The fruit is a berry, ovoid to ellipsoid in shape, with a persistent calyx at the base. Most vary from 3 to 8 inches (7.6 to 20.3 cm) in length. The skin is thick and woody with a russet brown, somewhat scurfy surface. The pulp of mature fruits is salmon pink, orange, red or reddish-brown in color, soft and smooth to finely granular in texture, usually low in fiber. The pulp has a sweet, almond-like, unique flavor. Normally, the fruit contains a single, large, elliptical seed but it may have up to four. The seed has a shiny, hard, dark brown surface with a light brown scar (hilum) on the ventral side. Seeds may crack and sprout in overmature fruits. Fruit weight ranges from 0.75 to 6.0 lb (0.3-2.7 kg).

Season

In Florida, the bloom season may be in summer, fall, and winter depending on the cultivar (variety). Because of this, each cultivar has its own main maturity season (Table 1). For example, 'Pantin' matures most of its crop in July and August with some fruit maturing before or after these months. 'Magana', on the other hand, matures its fruit in March and April with some fruit maturing before or after these months. Other cultivars will mature fruit in the winter, thus allowing for year-round harvest. Trees may have flowers, immature fruit and mature

fruit all at the same time. It takes from 13 to 24 months from flowering to fruit maturity.

Production

Seedling trees begin to bear fruit after 7 years or longer. Grafted trees begin to bear in 3 to 5 years. Mamey sapotes are very prolific. Mature trees may bear 200 to 500 fruit per year. Twice this amount may be obtained from large trees.

Varieties

The sapote has been widely propagated by seeds in the countries of its origin. There is great variation in seedling tree fruit shape, size, and pulp quality and color. Some seedling trees produce high quality fruit, and from these, superior types have been selected which are vegetatively propagated as named cultivars (Table 1).

In Florida, 'Pantin' accounts for the largest acreage, while 'Magana' is the next in importance. These two cultivars make up 95-98% of the acreage. Table 1 shows the characteristics of cultivars found in Florida. Different cultivars produce at different times of the year and planting of three to four cultivars may suffice to have mature fruit year-round (e.g., 'Tazumal', 'Pace', 'Magana', and 'Pantin').

Climate and Soils

The mamey sapote is a tropical tree which tolerates warm subtropical conditions, and is not tolerant of freezing temperatures (Figure 1). Young trees are very vulnerable to cold and are injured at air temperatures below 32°F (0°C). Mature trees can withstand 28°F (-2.2°C) for several hours with only slight damage but are killed if the temperature goes down below 22°F (-5.6°C) for very long.

The mamey sapote grows well in a wide variety of well-drained soils, from heavy clays to the limestone and sandy soils of Florida. Mamey sapote are intolerant of constantly wet or flooded soil conditions. The wet soil conditions decrease the oxygen content in the soil, causing roots to die which weakens the tree. In addition, weakened roots are more susceptible to attack by root rotting fungi (e.g., *Pythium* spp.).

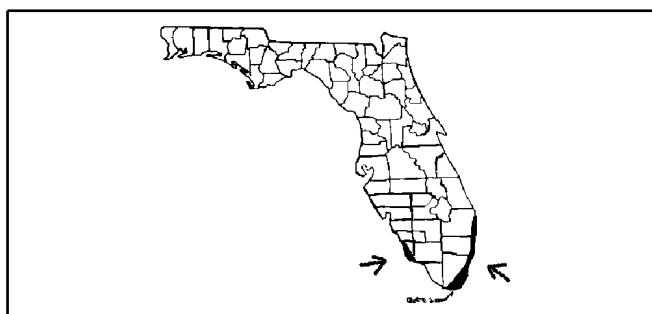


Figure 1. Fig. 1. Areas (shaded) of Florida where mamey sapote may be grown in the home landscape.

Cold Protection

Under commercial conditions, mamey sapote trees have been successfully protected from freezing by the use of high volume irrigation. However, this is does not work nor is it practical in the home landscape. Mamey sapote trees in the home landscape may be provided some limited protection from freezing by being planted in the warmest area of the landscape and/or being planted within 30 ft (9.1 m) of a building or adjacent overhanging tree. Caution, mamey sapote trees may become very large trees if left unpruned and may cause damage to structures due to limb breakage and tree toppling due to strong winds.

Propagation

Mamey sapote is difficult to propagate vegetatively; however, with proper attention to detail and repeated effort, a high rate of success can be achieved. Grafted trees should not be allowed to become root-bound as this may lead to poor or slow establishment after planting. This can be avoided by repotting into larger containers as tree size increases.

Seedage

Mamey sapote is commonly propagated by seed in many areas; however, this method is not recommended because seedling trees take 7 or more years to begin fruiting and the fruit quality may be poor. In Florida, seedlings are typically used as rootstocks for desirable cultivars.

Seeds should be collected from mature fruit and planted immediately in well-drained media. Seeds lose viability within 7 to 14 days and there is no good method for storing seeds. Seeds which have a

hairline crack in the seed coat appear to germinate more quickly. However, seeds without a crack will germinate satisfactorily. The seed coat can be cracked by placing seeds between two boards and gently applying pressure on the seed until a hairline crack is formed. Seedlings, if grown in beds, should be transferred to containers as they grow and should be ready to graft after 6 to 18 months when trees are 3 feet (about 1 m) tall.

Grafting and Budding

The two most important factors to consider in grafting mamey sapote are time of year and scion preparation. The best time of year to graft mamey sapote in Florida is when there are warm days, cool nights, and low relative humidity. This corresponds to conditions found from March to May and October to November. However, some experienced nurserymen cleft graft during summer and some graft year-round.

Selection and preparation of scionwood is essential for inexperienced grafters, however, for some professionals it is not necessary. Terminal branchlets are commonly used by commercial propagators. Preparation of this scionwood for grafting involves girdling the branchlet 10 to 12 inches (25.4 to 30.5 cm) below the terminal, 2 to 3 weeks before grafting is to take place. Removal of the leaves, leaving a small section of the petiole will stimulate growth of the buds found in the leaf axils. After budwood is removed from the tree it will be useful for grafting for 5 to 7 days. However, grafting should be done as soon as possible.

An alternative, which produces scionwood with a greater probability of grafting success is to produce new, young shoots by selectively pruning back mature limbs of desired cultivars. The pruning stimulates growth of numerous vigorously growing lateral shoots. These shoots are "juvenile-like" because of their rapid growth and lack of flowering. The terminal 8 to 12 inches (20.3 to 30.5 cm) of this "juvenile-like" growth is the best scionwood.

Removal of the apical bud of the rootstock about 24 to 48 hours prior to grafting enhances grafting success during warmer, more humid times of the year (i.e., spring and summer).

Modified veneer graft. Veneer grafting is a common method used for grafting mamey sapote. Scionwood should be collected and used the same day. In the spring, select shoots on which the terminal buds have hardened and are just beginning to grow. If terminals are not hardened off, subterminal scionwood can be prepared by removing the terminal bud and waiting until lateral buds begin to grow. Scionwood should be 2 to 4 inches (5.1 to 10.2 cm) long. To graft, make a shallow cut 4 to 6 inches (10.2 to 15.2 cm) long through the cambium layer being sure not to include any wood. Then an oblique cut is made on the reverse side of the scion. On the rootstock at 4 to 8 inches (10.2 to 20.3 cm) above the soil line, a shallow cut of similar length and diameter is made with a small flap of tissue left at the bottom of the rootstock to cover the oblique cut on the scion. After the scionwood and stock are joined, grafting tape (polyethylene is best) is used to wrap and completely cover the scion. Place the plant in about 50% shade. Usually the graft union will form in 3 to 7 weeks at which time tape can be gradually removed from those buds that have begun to grow. Grafted plants may then be exposed to increasing sunlight.

Cleft grafting. For scionwood, select young non-hardened terminals 2 to 4 inches (5.1 to 10.2 cm) long and remove two thirds of each leaf. To graft, cut the rootstock off at 6 to 8 inches (15.2 to 20.3 cm) above the soil line and make a vertical cut into the rootstock 1 to 2 inches (2.5 to 5.1 cm) long, splitting the rootstock in half. On the scion stick make two tapering cuts of similar length that end in a wedge (or V). Place the scion wedge into the vertical cut of the rootstock, matching cambial layers. Wrap the graft with grafting tape. Next, either cover the scion and rootstock shoot with a polyethylene bag and place in 50% shade, or place the plant in an intermittent mist bed (3 seconds mist every 3 minutes) with 50% shade until the scion begins to grow. After the bud graft union has formed and the graft begins to grow (4 to 6 inches; 10.2 to 15.2 cm) it may be exposed to increasing sunlight.

Budding. Mamey sapote may be propagated by T- and chip budding, however, the level of skill needed for success is much greater than with grafting.

Top-Working

Top-working of established trees to more desirable cultivars is difficult though possible. Trees to be top-worked are pruned back to main scaffold limbs or stumped. The main limbs and stump should be white washed with a 1:1 mixture of water and water-based latex paint. This will prevent the exposed limbs and trunk from sunburning. After new shoots have emerged, several are selected for modified veneer grafting with the desired scion cultivar.

Miscellaneous Methods

Alternative methods sometimes used by inexperienced propagators include the four-flap and approach grafting methods. While successful, these methods are somewhat cumbersome. Air layering and tissue culture have not been successful and are therefore not recommended.

Production (Crop Yields)

Seedling trees begin to bear fruit after 7 years or longer. Grafted trees begin to bear in 3 to 5 years. Mamey sapotes are very prolific and mature trees may bear 200 to 500 fruit per year. Twice this amount may be obtained from large trees.

Spacing

Plant spacing should be planned so as to provide adequate room for normal growth for several years. In general, trees in the home landscape should be planted 20-30 or more feet (6.1-9.1 m) from the nearest tree, building, and power lines. Trees planted too close to other trees or structures may not grow normally or produce much fruit due to shading.

Planting a Mamey Sapote Tree

Properly planting a mamey sapote 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 mamey sapote trees are grown in 3 gallon (11

liters) containers and trees stand 2 to 4 ft (0.6-1.2 m) from the soil media. Some nurseries are now producing mamey sapote trees in 5, 10, and 15 gallon (19, 38, 57 liter) containers. However, large trees in smaller containers (e.g., an 8 ft tree in a 3 gallon container; 2.4 m tree in a 11 liter container) 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 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.

The best time for planting is the beginning of the rainy season, especially if there is no way to water the tree easily. Planting can be done at other times if water is readily available.

Site Selection

In general, mamey 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 mamey 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 events.

Planting in Sandy Soil

Many areas in Florida have sandy soil. Remove a 3 to 10 ft (0.6-0.9 m) diameter ring of grass sod. Dig a hole 3 to 4 times the diameter and 3 times as deep as the container the mamey sapote 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 50-50 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 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 (0.9-3.1 m) diameter ring of grass sod. Make a hole 3 to 4 times the diameter and 3 times as deep as the container the mamey sapote tree has come in. To dig a hole there are several options 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 in the previous section.

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 rainfall events. To improve plant survival consider planting fruit trees on a 2 to 3 ft (0.6-0.9 m) high by 4 to 10 ft (1.2-3.1 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 mamey sapote tree has come 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 Mamey Sapote Trees in the Home Landscape

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

Fertilizer

Newly planted trees should be fertilized when the first new growth appears and during the growing season (mid-March to October) for the first 3 years (Table 3). As trees mature, the amount of fertilizer increases but the frequency decreases. Nitrogen fertilizer applications should be reduced or avoided during the late fall and winter (November through February) to prevent stimulation of new growth that could be damaged during a freeze.

Deficiencies of zinc and manganese may occur in calcareous soils and two to five foliar sprays may be applied from mid-March to September to correct them. Micronutrient formulations which include magnesium, manganese, zinc, and others (e.g., molybdenum, boron) are available and commonly used.

Iron deficiency may be prevented and corrected by the use of soil drenches containing chelated iron formulations especially made for alkaline soils (Fe-EDDHA forms) or especially made for acid soils (Fe-DTPA forms). Soil should be moderately moist before applying the chelated iron soil drench. One to two applications per year during the spring and summer months should give adequate maintenance of iron. Iron sulfate may be effective in preventing or correcting iron deficiency in acid, sandy soils.

Irrigation (Watering)

Adequate soil moisture is essential, especially during the first year of development. The young mamey sapote tree should be watered immediately after planting and every other day for the first 4 to 6 weeks unless there is sufficient rainfall. The trees should never be allowed to wilt, but too much water may damage the roots, especially in poorly drained locations. Mature trees should be watered one to two times per week with 1 inch (2.5 cm) of water during periods of insufficient rainfall. Watering during flowering, fruit set, and early fruit development is most likely important for setting fruit.

Insect Pests

Few insects attack the mamey sapote, and the damage they cause is seldom significant. The Cuban

May beetle (*Phyllophaga bruneri*) feeds on the leaves during the summer months and is more of a problem on immature compared to mature trees. The sugarcane rootstalk borer (*Diaprepes abbreviatus*) is a potential threat since it is present in Florida and attacks a wide variety of plants including mamey sapote. The adult rootstalk borers feed on the leaves while the larvae feed on the roots, causing wilting and even death in severe cases. Various scales such as the white peach scale (*Pseudaulacaspis pentagona*), philephedra scale (*Philephedra* sp.), green scale (*Coccus viridis*), quohog-shaped scale (*Palinaspis quohogiformis*), green shield scale (*Pulvinaria psidii*), tessellated scale (*Eucalymnatus tessellatus*), and wax scales (*Ceroplastes* sp.) are found occasionally, but the damage done is seldom sufficient to require control. Red spider mites (*Tetranychus bimaculatus*) may infest the leaves. An unidentified lepidopterous larva has been observed damaging blooms, and leafhoppers cause some damage to young leaves. Please contact your local Cooperative Extension Agent for current control measures.

Diseases

Anthracnose (*Colletotrichum gloeosporioides* Penz) may damage flowers, young leaves, and fruit, but it is usually not an important problem in Florida. During continuously wet conditions, red alga (*Cephaleuros virescens* Kunze) may attack twigs and limbs causing dieback. Roots may be attacked by various fungi (e.g., *Rhizoctonia* sp., *Pythium splendens*) which may cause a general decline in tree vigor. Please contact your local Cooperative Extension Agent for current control measures.

Mamey Sapote Trees and Lawn Care

Mamey 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 or more 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 mamey sapote trees spread beyond the drip-line of the tree canopy and application of some weed and feed herbicides adjacent to mamey sapote tree is not recommended and may affect plant growth. The use of lawn sprinkler systems on a timer may result in over watering and cause mamey sapote trees to decline. This is because too much water, too often is being applied which results in root rot.

Mulch

Mulching mamey sapote 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.

Pruning

Grafted mamey sapote trees may have one or more leaders (main trunks) with narrow, V-shaped crotch angles. The strongest and best situated leader should be encouraged to grow by removing all other leaders when the tree is first planted, or preferably in the nursery. In addition, mamey sapote trees have a tendency to produce three to four branches close to one another on the trunk. When this occurs, it is advisable to remove some of them so that the trees will develop a good framework of strong branches. Maintenance pruning of mature trees involves removal of narrow-angled (V-shaped) main branches which tend to split with heavy fruit loads. Wide-angled branches should be selected instead. Maintenance pruning of mature trees to remove dead or diseased branches and to limit tree size should be done periodically. Trees kept to a height of 12 to 15 feet (3.7-4.6 m) or less are easier to care for and are less susceptible to severe wind damage than trees allowed to grow tall.

Miscellaneous Problems

Drop of fairly large fruit is a problem in some seasons. Drought and diseases are suspected as the possible causes. Fruit cracking on the tree is a minor problem of unknown cause. Uneven ripening of some

cultivars, such as 'Magana', makes harvesting and marketing difficult.

Harvest, Ripening, and Storage

Mamey sapote must be harvested at the proper state of maturity to ripen satisfactorily. It takes experience to harvest the mamey sapote at maturity. A method commonly used to test fruit maturity is to make a small scratch on the skin surface to remove just the outer, scurfy layer. The fruit is mature if the newly exposed layer has turned from green to pinkish-brown, orange, or red. The fruit should be removed carefully by twisting or cutting it off, avoiding scratches which mar appearance and result in irregular ripening and poor storage life. Immature fruit will completely fail to soften, their pulp will turn dark brown and will be inedible. For commercial purposes, fruit can be harvested when the flesh begins to redden, but for home use it should become completely reddish. The fruit will soften in a few days to a week, if picked at the proper stage. Soft, mature fruits will store well in the refrigerator at 50-55°F (10-13°C). Fruits should be transported at 55°F (13°C).

Uses and Nutritional Value

The mamey sapote is usually eaten in preparations where the fresh or frozen pulp is mixed with other ingredients to make milkshakes or ice cream. It also may be eaten fresh directly from the fruit by cutting it lengthwise and removing the seed. It is also excellent for use in jellies, pastes, and conserves. The seed can be milled to prepare a bitter chocolate.

The mamey sapote is a worthy fruit not only for commercial production but also as a fruit tree for the home landscape, if space is not limiting. It requires little care and yields a useful, attractive, good tasting fruit.

The nutritional composition of 100 g of fresh mamey sapote is 107 calories; 1.0 g protein; 0.5 g fat; 28 g total carbohydrates; 1.4 g fiber; 0.7 g ash; 22 mg calcium; 14 mg phosphorus; 0.9 mg iron; 6 mg sodium; 226 mg potassium; 60 I.U. vitamin A; 0.02 mg thiamine; 0.02 mg riboflavin; 1.4 mg niacin; and 23 mg ascorbic acid.

Table 1. Characteristics of mamey sapote cultivars and each cultivar's suitability for planting in the home landscape.

Cultivar	Source ¹	Maturity season	Fruit size grams/ounces	Pulp color	Flavor	Tree size/ habit ⁴	Yield	Cold tolerance	Precocity	Rec. for home landscapes ⁵
'Copan'	TREC	July-Aug.	425-900/15-32	Red	Excellent	Medium/spreading	High	Yes	No	No
'Magana'	TREC	April-May	740-2400/26-85	Pink	Good	Small/slow growing	High	No	Yes*	Yes
'Mayapan'	TREC	July-Aug.	510-1135/18-40	Red	Good	Tall/upright	High	Yes	No	Yes
'Tazumal' ²	TREC	Jan.-Feb.	400-850/14-30	Pink	Good	Medium	High	Yes*	Yes	No
'AREC' No. 3 ³	TREC	July-Sept.	400-740/14-26	Pink	Poor-good	Medium	Medium	Unknown	Unknown	No
'Pantin' (Key West)	'Pantin'	July-Aug.	400-1130/14-40	Pink-red	Excellent	Tall	Medium	Yes	No	Yes
'Piloto'	'Lara'	Aug.-Sept.	400-740/14-26	Pink-red	Excellent	Medium	Medium	No	No	No
'Pace'	'Lara'	Mar.-Apr.	425-900/15-32	Salmon	Excellent	Tall	High	Yes	Yes*	Yes
'Florida'	'Lara'	Mar.-Apr.	400-1130/14-40	Pink-red	Good	Tall	High	No	No	No
'Lara'	'Lara'	Aug.-Sept.	400-1130/14-40	Red	Excellent*	Unknown	Unknown	Yes*	Unknown	Yes
'Chenox'	Zill	May-June	400-850/14-30	Pink	Good	Medium	Medium	Unknown	Unknown	No
'Abuelo'	Acosta	Oct.-Nov.	740-2400/26-85	Deep red	Excellent	Spreading	Medium	Unknown	Unknown	No
'Francisco Fernancez'	Lessard & Lara	Aug.-Sept.	560-700/20-25	Pink-red	Excellent	Upright	Medium	No	Unknown	No
'Flores'	Economou	Nov.-Dec.	740-2400/26-85	Red	Excellent	Upright	Unknown	Unknown	Unknown	No
'Viejo'	Martinez	Dec.	400-560/16-20	Deep red	Excellent	Spreading	Unknown	Yes*	Yes*	No

¹ TREC, Tropical Research and Education Center; Pantin, Don Pantin; Lara, Pablo Lara; Zill, Lawrence Zill; Lessard, Bill Lessard; Acosta, Beinvenido Acosta; Lessard & Lara, William Lessard and Pablo Lara; Economou, Tom Economou; Martinez, Ramon Martinez.² 1-2 seeds per fruit

³ 3-4 seeds per fruit

⁴ Observations on many cultivars have not been completed.

⁵ Recommended for planting in the home landscape.

* emphasized.

Table 2. Cultural calendar for production of mature (bearing) trees in the home landscape.

Operation	Jan.	Feb.	March	April	May	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
General ¹			The period from March through September is generally the best time to apply granular mixes containing nitrogen-phosphate-potash-magnesium (N-P-K-Mg).									
Nutritional sprays ²			Apply 2 to 4 nutritional sprays to the leaves anytime from March through October. Sprays should contain magnesium, manganese, zinc, molybdenum, and boron. Follow dilution directions on the label.									
Iron applications			The period from April through September-October is generally the most effective time to apply 2 to 4 soil drenches of chelated iron material to high pH, calcareous soils or to apply 2 to 4 soil applications of iron sulfate to acid, sandy soils.									
Watering	Water trees during after periods of 5 to 7 days or more. Watering during the summer may be unnecessary unless drought conditions prevail. Water less during the winter months (November to February).											
Insect control	Monitor the tree for insect infestations year round. Have the insects identified first and contact your local Cooperative Extension Agent for recommended control.											
Disease control								Monitor trees exposed to excessively wet soil conditions for signs of root rot: wilting, leaf yellowing, leaf drop, and stem dieback. Contact your local Cooperative Extension Agent for recommended control.				
Pruning								Selectively prune bearing trees during the warmer time of the year to reduce tree height and if necessary, spread of the tree canopy. This should be done annually.				
1, Examples of dry fertilizer materials include 6-6-6-2, 8-3-9-3, and 4-2-12-2 (N-P-K-Mg). 2, A spreader-sticker may be added to the nutritional spray to help prevent washing off due to rainfall.												

Table 3. Fertilizer program for mamey sapote trees in the home landscape.

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

1, Use 6-6-6-2, 8-3-8-3, or similar N-P-K-Mg granular materials.
 2, The nutritional spray should contain magnesium, manganese, boron, and molybdenum; it may also contain iron. Foliar sprays are most effective from March through October.
 3, Iron chelate soil drenches (iron plus water) will prevent iron deficiency; foliar iron sprays are generally not effective. Apply soil drenches from April through September-October.

Table 4. Nutrient value of raw mamey sapote fruit (3.5 oz or 100 g of fruit).¹

Constituent	Approximate value	Constituent	Approximate value	Constituent	Approximate value
Water content	62%	Carbohydrate	33.8 g	Phosphorus	28 mg
Calories	134 kcal	Total dietary fiber	2.6 g	Potassium	344 mg
Protein	2.1 g	Calcium	39 mg	Sodium	10 mg
Fat	0.6 mg	Iron	1.0 mg	Vit. C	20.0 mg
Cholesterol	0.0	Magnesium	30 mg	Vit. A	410 IU

1, Data taken from the U.S. Department of Agriculture, Agricultural Research Service. 2005. USDA Nutrient Database for Standard Reference, Release 18. Nutrient Data Laboratory Home Page, <http://www.nal.usda.gov/fnic/foodcomp>