



The Cashew Apple (*Anacardium occidentale*) in Florida

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Scientific Name: *Anacardium occidentale*

Synonyms: *Acajuba occidentalis*, *Cassuvium pomiferum*

Other Names: Maranon, cajuil, merey (Spanish), caju (Portuguese), acaju (French)

Family: Anacardiaceae

Relatives in the Same Family: mango (*Mangifera indica*), Brazilian pepper (*Schinus terebinthifolius*), spondias (*Spondia* spp.) and poison ivy (*Toxicodendron radicans*).

Origin: N.E. Brazil

Distribution: The cashew is now of pan-tropical distribution, and is grown commercially in many tropical areas of the world including E. Africa, S.E Asia, India and Australia, with India and Brazil currently the leading producers. Since cashew requires a frost-free tropical climate, planting in the U.S. is limited to extreme southern Florida, Hawaii and Puerto Rico. There is no significant commercial production in the U.S., though cashews are grown in botanical collections and some home yards.

History: Portuguese explorers first took the cashew from Brazil to India (Goa) and then to Mozambique (Africa) in the 16th century. From these two areas the cashew spread to other parts of E. Africa and Angola, as well as throughout S.E Asia and northern Australia. It is likely that Spanish explorers spread the plant to Central America and the Caribbean basin. Cashews were first imported to the United States from India in the early part of the 20th century.

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Although the cashew nut is now far more important as an item of commerce, interest initially centered on the cashew apple. There are areas of the Caribbean, South and Central America and E. Africa, where trees are still grown solely for local cashew apple consumption.

Description

Tree: Under ideal tropical conditions the cashew is an attractive, erect, 20-35 ft. evergreen tree, with smooth brown bark, and a dense symmetrical, spreading canopy. Branching occurs very low on the trunk, with the lowest limbs often touching the ground where they can take root. More usual, where conditions are less than optimal, the tree grows to no more than 15-25 ft., and can develop an ill-defined trunk, and a sprawling, straggly growth habit. Such trees are of less ornamental value to the landscape, though the colorful fruit remains an attractive feature. Dwarf types have been developed, ideal for the smaller yard, but these are not available in the U.S. at the time of writing.

Where soil conditions permit (e.g. deep sandy loams), the tree develops a pronounced taproot. The oolitic limestone that underlies the thin soils of Miami-Dade precludes substantial development of a taproot. Cashews rapidly develop an extensive system of lateral roots that reach far beyond the edge of the canopy.

Foliage: The leaves are green, simple, arranged alternately on the stem, with a short petiole (stalk). Each leaf is 6-7 inches long, with a rounded, or sometimes notched, tip, leathery, smooth and pliable, with prominent veins.

Inflorescence: Cashew flowers are borne in 4-8 inch terminal panicles and consist predominantly of male flowers and some perfect (bisexual) flowers – there are no female flowers (andromonoecious). Individual flowers are sweet-smelling, small with usually five yellowish green petals, each about 0.4 inch long. The petals turn pink and become recurved as the flower fully opens. On opening, flowers are receptive to pollen for only a day. The stigma is immediately receptive, however release of pollen occurs later, thereby permitting an opportunity for cross- fertilization.

Fruit: The true fruit is a kidney shaped nut consisting of a double walled shell (an outer thick exocarp, and an inner hard endocarp separated by a resinous, cellular mesocarp), surrounding an edible kernel – the cashew nut of commerce. The nut is green at first, but becomes a grayish brown as it develops. As the nut approaches maturity, the stalk (or more accurately receptacle) becomes swollen and fleshy, forming a 2-4 inch yellow or red, juicy, pear-shaped pseudo-fruit, and is known as the cashew apple.

Great care must be exercised in handling raw nuts, since the shell contains a poisonous, thick, caustic oil, which can cause severe dermatitis in susceptible

individuals. Note that cashew is in the same family as Brazilian pepper and poison ivy, both well known as capable of inducing severe allergic reactions.

Flowering and pollination: In a seasonally dry climate, flowers are produced immediately after the rainy season. In tropical climates that are wet on and off throughout the year, flowering can occur at any time. Although the bisexual flowers are self fertile, they are not self-pollinating. The presence of scented flowers and sticky pollen is circumstantial evidence of an important role for insect pollinators. Studies to date have implicated both wind and a variety of insects as pollinating agents, but there is no information on their relative importance under south Florida conditions.

Climate and Soils: Cashew is best adapted to a seasonally dry tropical climate, with active growth occurring at temperatures from 63°F - 100°F. The tree will not tolerate even short exposures to frost. Annual rainfall between 27-78 inches is optimal, though trees will survive with as little as 2-15 inches of rain. More important than the amount of rain is its distribution throughout the year. It is essential that the period from flowering up to harvest coincide with a dry time of the year.

Cashews do best on deep sandy soils, but thrive on rocky, low fertility soils, unsuitable for most other fruit trees. Soils with a pH of 4.5–6.5 are preferred, those with a higher pH, such as the oolitic limestone found in Miami-Dade, are liable to promote nutritional deficiencies of iron, zinc and manganese.

Propagation: For homeowners the easiest method of propagation is from seed, obtained by separating the nut from the ripened cashew apple. The unshelled nuts (seed) are dropped in a bucket of water, left for 5-10 minutes, and those that float are discarded. Seeds that sink can either be planted immediately, or sun-dried for storage. Dried seed should be placed in an airtight container with wood shaving, for storage in a cool dry place. Stored seed should be used within 7-12 months, and soaked in water for 24 hours before planting.

It is usual to sow seeds directly in the ground since seedling trees are difficult to transplant without damaging the brittle roots. Use 3-4 seeds and expect germination after 2-4 weeks. Allow the seedlings to grow until they are about 6 inches tall then select the most vigorous plant and remove the other two. If containers are used choose those that are biodegradable such as peat pots. After the seeds germinate, remove the weakest two seedlings and allow the remaining plant to grow to about 12" then place the entire peat pot containing the seedling tree into the planting hole.

Since seed grown plants do not come true to type, vegetative means are required to propagate superior cultivars, with air layering being the preferred method. Stem cuttings can be used, however it is important to use a light, well aerated growing medium, to provide shade from direct sun and continuous high humidity (e.g. misting). Best results were obtained when semi-mature wood was used. Though not as common trees can also be budded, and to a lesser extent grafted.

Planting and Care: Trees should be planted in full sun – they will not tolerate any shade – in an area that is not prone to flooding. Set the tree at or slightly above grade and backfill with soil that came from the planting hole as far as possible. Any additional soil that is required should be sandy and free draining. Do not backfill with black or muck soil. Allow a spacing of at least 15 feet between trees, and further if in the vicinity of a structure or sewer line. Little pruning is usually required – remove low branches within 2 feet of the ground, and prune out dead wood.

Fertilizer Application: Cashews respond well to fertilizer, but there are no specific recommendations for Miami-Dade, and the following are suggested based on experience with related fruit trees grown in Miami-Dade. Use either an 8-3-9 fruit tree fertilizer, or a slow release, complete, palm special having an 8-4-12 ratio of N/P/K, 2-4% magnesium plus minor elements. These newer palm fertilizers are suitable for most tropical trees and shrubs grown in Miami-Dade. For the first year apply 4 oz of fertilizer every 2 months, then beginning with the second year through the third year gradually increase the amount of fertilizer from 8 oz to 1 lb per application. Foliar nutritional sprays containing minor elements, especially manganese and zinc, should be used 4-6 times a year between April and September to counter trace element deficiencies. A deficiency of iron produces severe symptoms in cashews, and this can be corrected by using a chelated source, suitable for soils above pH 7.5, at 0.5-2.0 oz/tree/year, applied from June to September.

For mature trees use an annual total of 15–20 lbs of fertilizer, splitting the applications into three – one as bloom appears, another as the fruit reaches maturity and a final application in August. Apply nutritional sprays as above and increase the amount of chelated iron used as a soil drench to 3-4 oz per tree.

Irrigation: The area to which cashew is indigenous is one with a dry climate, so the tree will not thrive when rainfall or watering is excessive. The tree will benefit from supplemental water when in bloom or carrying a crop. Restrict watering at these times to once a week in the absence of rainfall. At other times of the year there is no need to water trees.

Pests and diseases: There is no specific information on pest problems of cashew in Miami-Dade. In those areas of the tropics where there is extensive experience growing cashew, important pests have included various insect borers (larval stages of beetles and moths), insects that destroy flowers or foliage (beetles, caterpillars, thrips and mirids) and those that attack fruit (plant bugs, beetles and caterpillars).

A number of fungal pathogens have been reported as causing leaf spotting, die back of shoots or damage to flowers and fruits. As with mango, anthracnose disease is potentially the most serious problem in Miami-Dade, especially during bloom time and fruit set. Make weekly spray applications of a liquid copper fungicide, commencing when flower panicles are 1 inch in length and continuing on a weekly basis until 3-4 weeks after final fruit set. Frequency of spraying can then be reduced, except during periods of wet weather. Powdery mildew is another fungal disease that causes

destruction of flowers on mango and can be expected to cause similar problems on cashew. Include liquid/flowable sulfur in every other application of liquid copper to minimize damage to bloom from powdery mildew.

Weed Control: Maintain a circular 4-6 ft. area around the trunk free of lawn grass, and remove weeds as they appear. A 2-4 inch layer of mulch will help to suppress weed growth, but make sure it is 6-8 inch away from the trunk. Do not use products containing the herbicide atrazine (i.e. to control weeds in the lawn) within the root zone of the tree.

Pruning: Little pruning is usually required. To improve tree structure and prevent straggly growth, tip pruning is recommended. Remove 1-2 inches from all shoot tips during spring and summer for the first two years after planting. This will stimulate new growth behind where the stems were cut, and promote development of a more compact, well-structured tree. Trees should be maintained at no more than 14-15 feet in height.

Production and Harvesting: Wet weather during flowering and fruit set will severely reduce yields, and under Miami-Dade conditions it is essential to adopt a spray program similar to that used for mango (see below). It usually takes from 2-3 months before fruit is ready for harvesting. When ripe, the fruit falls to the ground and is then collected for processing. The cashew apple is highly perishable and will spoil rapidly within the first day of dropping from the tree. For this reason it is advisable to remove fruit by hand, where trees are being grown for the cashew apple rather than the nut.

The yield of a given tree is a function of the number of bisexual flowers produced. It is important for backyard growers to remember that since most of the flowers produced are male, the yield of fruit may not be as much as expected from the amount of bloom. In countries where trees are grown commercially, cultivars are being developed with increased numbers of bisexual flowers. As with other fruit trees such as mango and avocado, it is quite common for some of the fruit to drop from the tree as it develops. A mature tree is capable of producing about 50-75 lbs of fruit (cashew apple plus nut).

Processing: It is *inadvisable* for homeowners to attempt shelling and consuming nuts produced by backyard cashew trees. The shell contains a reddish-brown, viscous, oily liquid composed of various phenolic lipids. This oil is *poisonous* and acts as a powerful vesicant, causing extensive blistering of the skin. Removal of the kernel from raw nuts requires special precautions. It is usual to first roast the nuts to remove most of these oils before shelling. This should *not* be attempted at home, and certainly never indoors, as the oil is volatile and could cause severe respiratory problems. It is also important when shelling nuts to avoid any contamination of the kernel with oil from the shell.

The cashew apple is used either for juice or preserved in syrup (candied). The fresh apples are very astringent due to their high tannin content, and are much more

palatable if first processed to remove the bitter taste. This can be accomplished either by steaming under pressure (i.e. a pressure cooker) for 10-15 minutes, or boiling in salty water for 15 minutes. The apples are then pressed to remove excess moisture and boiled in cane sugar syrup for 2 hours. Finally they are sun dried, or placed in an electric food drier. Cashew apples are also canned in syrup, used to prepare chutneys and fruit pastes, and because of the high pectin content, readily set when making jams.

The juice can also be extracted, strained after which gelatin is added at a rate of $\frac{1}{4}$ oz per 3 cups of strained juice with constant stirring for 15 minutes. The tannins in the juice bind to the gelatin and form a precipitate, which can then be removed by filtering through muslin. Sugar can then be added to taste. The juice readily ferments, and is used in various countries to prepare wines and distilled liquors (e.g. Brazil, Guatemala, W. Africa, India, Sri Lanka and The Philippines). Take care when handling the juice since it can permanently stain clothing.