

Ackee Growing in the Florida Home Landscape¹

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Introduction

Scientific Name: *Blighia sapida*

Common Names: ackee, akee, achee, vegetable brains

Family: Sapindaceae

Relatives: lychee, longan, rambutan

Origin: Indigenous to the Ivory Coast and Gold Coast of West tropical Africa.

Distribution: Trees may also be found in many Caribbean countries (Jamaica, Trinidad, Haiti, Bahamas), Central America (e.g., Costa Rica, Panama, Guatemala), South America (Brazil, Venezuela, Surinam, Colombia, Ecuador), as well as the United States, (Florida).

History: The species was brought to Jamaica in 1793 by Captain Bligh and is now naturalized throughout that country.

Importance: Ackee is not grown commercially in Florida and is not common in the home landscape. Ackee is grown commercially and wild (feral) trees are harvested for fresh and canned fruit in Jamaica.

The fruit is a commonly used ingredient in Jamaican cooking both at home and in restaurants and is a main component of that country's national dish.

CAUTION: Most of the ackee fruit is not edible; only the fleshy pulp (aril) attached to fully developed, inedible seeds may be eaten when fruit is picked at the right stage of development and prepared properly. The fruit must *only* be picked after the fruit has naturally opened (split; sometimes called awned). *All parts of the immature (unripe) or overripe fruit are highly poisonous (hypoglycin A and B toxin).* The red tissue and veins that attach the aril to the seed *must* be removed before eating properly harvested fruit.

Recommendation: Although the foliage and bright red fruit of ackee are beautiful, they are ***not*** **recommended for home plantings by anyone unfamiliar with the fruit of this tree.** In addition, children and adults unfamiliar with the fruit must be kept from consuming the fruit if it is accidentally picked at an improper stage of development. This publication is intended to educate the general public on this fruit and provide cultural information to those intimately familiar with this fruit. **This publication is**

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not an endorsement for planting ackee
in the home landscape.

Description

Tree

Medium to large tree (30-75 ft/ 9-23 m) with a rounded to oval shaped canopy.

Leaves

Evergreen with alternate pinnate (compound) leaves with 6 to 8 leaflets with short petioles; leaflets are shiny green, stiff, 6 to 8 inches (15-20 cm) long.

Inflorescence (Flowers)

The ackee flowers from pseudoterminal shoots, in other words, flowering looks to be terminal but in fact new shoot growth continues from the area next to the lateral raceme. Bisexual and male flowers are borne together on simple racemes 3 to 7 inches (7.5-17.5 cm) long. The white flowers have 5 sepals, 5 petals, and a nectary disc at the base from which 1 to 8 stamens are attached and a superior ovary with 3 stigmas. Trees may bloom 1 to 3 times per year with the heaviest bloom during spring.

Fruit and Pollination

The fruit is a 3-lobed, pear-shaped capsule that has a leathery yellow to bright red peel. Fruit is 2.75-4.0 inches (7-10 cm) long. In general, the fruit turns red upon maturity. At maturity the capsule splits open longitudinally (commonly called yawned) to expose 3 large, black, smooth, hard, shiny seeds seated upon and partially embedded in cream-colored, fleshy, and glossy arilli (pulp) (Fig. 1). The base of each aril is attached to the inside of the stem-end of the fruit by a pink to orange-red membrane. Ackee is insect pollinated.

Varieties

There are a number of locally recognized types of ackee: regular (moderate pulp hardness); hard (hard pulp); and soft, sometimes call butter ackee. Other selections are called "cheese." These have more flesh around the seed, and the pulp has a smooth



Figure 1. Non-mature (closed) ackee fruit and naturally split (awned) ackee fruit on the tree. Credits: Stephen Brown, Horticulture Extension Agent IV, Lee Co. Coop. Extn. Service, Ft. Myers



Figure 2. Ackee fruit split naturally. Credits: Stephen Brown, Horticulture Extension Agent IV, Lee Co. Coop. Extn. Service, Ft. Myers

texture. They are considered superior to the more common forms.

Climate and Environmental Tolerance

Ackee trees are adapted to tropical and warm subtropical areas and may be planted from sea level to an altitude of about 3,000 feet (900 m). Trees are moderately cold tolerant and may withstand brief cold temperatures down to 26°F (-3.3°C). Well established ackee trees appear to tolerate dry soil conditions, although fruit production may be negatively affected. Ackee trees are not flood tolerant and may decline under flooded soil conditions. 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

Ackee 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 ackee begins to produce fruit in 3 to 6 years. Superior types may be propagated by grafting (side-veneer or cleft), budding (patch) onto seedling rootstock, or by rooting of stem cuttings dipped in rooting hormone under mist.

Production (Crop Yields)

Ackee fruit production data is not available; however, observations suggest that well-cared-for mature trees produce 100 to 150 lbs (45-68 kgs) per year. In the subtropics, flowering may be induced by cool temperatures, and in the tropics, flowering may be induced by a pronounced dry period. In some areas, ackee may produce year round (Jamaica) or have one or more distinct crops per year depending upon where they are being grown. In Florida, a major flowering occurs during the spring and the crop is harvested during the summer; there may be a light flowering during the fall and fruit during the winter.

In tropical areas, the major flower-inducing trigger is probably wet weather after a pronounced dry period where during the dry period the tree slows or stops vegetative growth, allowing the buds in the leaf axils to mature and form flowers. Subsequently, under natural conditions, when the rainy season begins, the tree flowers. In subtropical areas, trees probably respond to wet-dry periods and cool temperatures (which also inhibit vegetative growth).

Spacing

Ackee 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

Trees appear to grow well in well drained, deep, fertile soils and non-fertile soils like sands and oolitic limestone.

Planting an Ackee 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 ackee trees are grown in 3-gallon (11-liter) containers and trees stand 2 to 4 ft (0.6-0.9 m) 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, ackee 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, ackee trees can become 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 ackee 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 either 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 South Florida have a very shallow soil, and several inches below the soil surface is hard, calcareous bedrock. Remove a 3 to 10ft diameter (0.9-3.1m) ring of grass sod. Make a hole 3 to 4 times the diameter and 3 times as deep as the container the ackee 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 3ft high by 4 to 10ft diameter (0.6-0.9m by 1.2-3.1m) 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 Ackee Trees in the Home Landscape

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

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 2). 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 fruit-bearing ackee 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 (P₂O₅)-6 (K₂O)-2 (Mg)] and 8-3-9-2 [8 (N)-3 (P₂O₅)-6 (K₂O)-3 (Mg)].

From spring through summer, trees should receive 2 to 3 annual nutritional sprays of copper, zinc, manganese, and boron for the first 4 to 5 years. Ackee 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 ackee 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 ackee trees (first 3 years) should be well watered twice a week. Once the rainy season arrives, irrigation may be reduced or stopped.

Once ackee 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.

Ackee Trees and Lawn Care

Ackee 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.

The use of lawn sprinkler systems on a timer may result in over watering and cause ackee trees to decline. This is because too much water too often applied causes root rot.

Mulch

Mulching ackee 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 around the base of the tree with a 2 to 6 inch (5-15cm) 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

Ackee has few insect pests in Florida at the present time. If the tree becomes infested with an insect, contact your local county extension agent for more information and current control recommendations.

No major diseases of ackee have been reported in Florida at present. Contact your local county extension agent for assistance in identification and current control recommendations if disease symptoms occur.

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 (3.6-4.6 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 danger of frost has passed. Severe pruning is sometimes used to reduce tree height or width of very large trees. Pruning does not injure ackee trees, but may reduce

fruit production for one to several seasons. Once ackee 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 ackee trees should be done by a professional arborist who is licensed and insured.

Harvest, Ripening, and Storage

Ackee fruit are harvested after the fruit has split longitudinally. ***Fruit picked prior to splitting or that has been split too long (i.e., over ripe) is poisonous.*** The flesh of the ackee aril is only edible and nonpoisonous after the fruit capsule has split naturally and the flesh is firm. Fruit that has not split open naturally or where the aril is soft or discolored is extremely poisonous. Only the pulp (aril) of fully formed ackee should be consumed.

Uses and Nutritional Value

Fresh ackee is generally not available in the U.S.; however, canned product is sometimes imported from Jamaica. The firm edible arilli may be eaten fresh or more commonly cooked as a component of traditional Jamaican cuisine (e.g., salt cod). The fruit arilli are a moderate source of calcium, iron, potassium, and ascorbic acid (Table 3). They also possess a small amount of antioxidants (IC_{50} value = 6.6 μ g/ml).

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

Operation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry fertilizer ¹			Apply 2-3 dry applications of nitrogen-phosphate-potash-magnesium material during this time.									
Nutritional sprays ²			Apply 2-3 foliar nutritional sprays containing magnesium, manganese, zinc, molybdenum, and boron; they are most effective during the warm part of the year.									
Iron applications ³		Apply 1-2 iron applications to the soil around the base of the tree. Iron applications are most effective during the warm part of the year.										
Watering	Water periodically during prolonged dry periods.									Water periodically during prolonged dry periods.		
Insect control	Monitor for insect problems and treat as needed.											
Disease control	Monitor for disease problems and treat as needed.											
Pruning								Selectively prune after harvest to control tree height and spread.				
Operation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

¹ Use 6-6-6-2, 8-3-9-2, or similar material.² Foliar sprays should contain zinc, manganese, boron, and molybdenum; they may also contain iron. Foliar sprays are most efficient from April to September.³ 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 2. Fertilizer recommendations for ackee in Florida.

Year	Times per year	Amount per tree (lbs) ¹	Total amount per tree (lbs) ²	No. of minor element sprays per year ³	Chelated iron soil drenches (oz/tree/year) ⁴
1	6	0.25 - 0.5	1.5 - 3.0	2-3	0.5 - 0.75
2	6	0.5 - 1.0	3.0 - 6.0	2-3	0.75 - 1.0
3	6	1.0 - 1.5	6.0 - 9.0	2-3	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
8	2-3	4.5 - 5	18.0 - 20.0	2-3	2 - 4

¹ Amount per tree per application. Use 6-6-6 or 8-3-9 or slow-release fertilizer.

² Total amount per tree per year.

³ Spray should contain zinc, manganese, boron, molybdenum and may also contain iron and magnesium.

⁴ Chelated iron soil drenches will prevent iron deficiency. Foliar sprays are not effective.

Table 3. Nutrient value of 100 g (3.5 oz) fresh ackee.¹

Constituent	Approximate Value
Water content	76.7%
Calories	151 kcal
Protein	2.9-8.8 g
Fat	18.78 g
Sat. fat	0 g
Cholesterol	0 g
Carbohydrate	9.55 g
Total dietary fiber	2.7-3.5 g
Calcium	35-83 mg
Zinc	1 mg
Iron	0.7-5.52 mg
Phosphorus	98 mg
Potassium	270 mg
Sodium	240 mg
Ascorbic acid	30-65 mg
Niacin	1.1-3.94 mg
Thiamine	0.03-0.10 mg
Riboflavin	0.07 mg

¹ Food Reference Website: Facts and History [<http://www.foodreference.com/html/artackee.html>] (accessed 8-15-07) and Anonymous. 2006. Ackee. Nyam News from the Caribbean Food and Nutrition Institute (CFNI). CFNI-Pan American Health Organization. May Nos. 1&2:1-2 [ISSN 0255-8203].