Coconuts (*Cocos nucifera*) are the seeds of the coconut palm tree. It is difficult to pin down the birthplace of the tree (most believe it to be the South Pacific or Malay Archipelago), as coconut seeds are extremely hardy and can float in salt water over long distances to germinate once they wash ashore. In the wild, ripe coconuts fall from trees and grow where they land. As a result, there are wild palm trees throughout the tropics and in many areas with warm climates, but cold temperatures will inhibit fruit bearing.

Coconut palm trees are planted commercially in tropical lowlands. The most commonly grown ‘nut’ in the world is not really a nut but a drupe, with oval seeds composed of an outer skin, a fibrous husk that is green or yellow initially and then brown at maturity, and the hard shell most people see in the grocery store. The shell houses the copra or the white, fleshy meat and coconut water (coconut milk is produced by crushing the meat). The more mature the coconut, the more meat and water absorption, leaving less liquid.

Trees are classified as dwarf or tall and the latter can reach heights of over 90 feet. Average height is from 50 to 60 feet for tall varieties while dwarf trees mimic their name and rarely reach heights of over 25 feet. Coconut palms, which contain the seed or nut surrounded by a husk, can grow up to 18 inches in length and 12 inches in diameter. The nut itself can reach 6 to 8 inches in diameter with three sunken soft tissue spots called “eyes” at one end.

The copra and coconut water are edible and used throughout the world in foods and drinks. Coconut oil can be harvested from the copra and is used to produce soap, shampoo, cosmetics, cooking oil, and margarine. The fibrous husk material can be used as a soil substitute for growing fruit, vegetables, or ornamental plants, and is often used in greenhouse operations.

*References: Purdue University, University of Florida IFAS Extension, University of Hawaii, USDA.*
**Types, Varieties & Cuts**

Two of the fastest growing coconut palms are the Jamaican Tall, which is sometimes called the Atlantic Tall. Other varieties include the Fiji, Philippines, and the Panama Tall (most types are named after the country in which they grow). The Malayan Dwarf Palm is smaller and slower growing. The Maypan is a hybrid of the Malayan Dwarf and the Panama Tall. Other dwarf varieties include the Ghowcat and Chowgat, and several Kalpa cultivars popular in India. Tall varieties have a lifespan of 80 to 90 years while dwarf trees survive up to 30 years in most climates.

Coconuts are sold in the husk or as the round, dark brown coconut seed that has been removed from the husk.

*References: Produce Marketing Association, University of Florida IFAS Extension, University of Hawaii.*

**Pests & Disease**

Fungicides are not approved for postharvest use on coconuts in the United States. Immature, trimmed coconuts can be treated with the preservative metabisulfite to prevent browning. A stronger metabisulfite solution can extend storage time 2 to 7 days. Wet coconuts will cause mold growth particularly in immature, trimmed coconuts.

Coconut palms are susceptible to *lethal yellowing disease*, *bud rot* caused by *phytophthora palmivora* fungus, *thielaviopsis trunk rot*, *stem bleeding*, and *chalar paradoxa* fungus. Most of these can be prevented through well-drained soil and avoidance of damage to tree trunks, particularly during transplantation. Lethal yellowing can be treated with antibiotic injections either on a preventative basis when the disease is found or as a repeated treatment after infection.

Pests of concern include the *coconut mealybug*, *rhinoceros beetle*, *American palm cixiid*, *red palm weevils and mites*, *spider mites*, *palm aphids*, and *caterpillars.*

*References: University of Florida IFAS Extension, State of Hawaii (Hawaii.gov), University of Hawaii.*
CULTIVATION, STORAGE & PACKAGING

Preharvest:
Coconut palms can tolerate a wide range of soil types provided it is well drained with a pH range from 5.0 to 8.0. The tree is resistant to salt spray and does well along shorelines, but can be grown inland. Minimum average air temperature of 72°F and annual rainfall of at least 30 inches are required for successful cultivation as well as full sunlight. Coconut palms can tolerate hurricane-force winds and short periods of flooding or drought, but injury and possible death will result from cold snaps and temperatures below freezing.

Planting is generally during rainy summer months in beds several feet high and wide to prevent waterlogging of roots. Trees are commercially planted between 18 and 30 feet apart. When transplanting, irrigation of at least one inch per week is particularly important in the first year. Mulching is recommended to retain moisture and discourage weeds.

Coconuts to be used for seed are ready to plant if they produce a sloshing sound from the liquid inside when shaken. Nuts are half-buried on their sides in sand or mulch. Germination is most successful in hot weather with temperatures of 90 to 100°F. Tree trunks become established in about 5 years and begin to produce male and female flower clusters. Healthy trees produce fruit in 5 to 10 years with full production reached between 12 and 20 years old. Tall tree varieties will fruit until the plant is around 80 years old, producing from 50 to 200 fruits throughout the year depending on the variety.

Postharvest:
Coconuts are harvested throughout the year and picked at different maturities depending upon use—a year maturity for copra or dehydrated coconut, 7 months for coconut milk. Harvest is done by tree climbers or from the ground using long poles with knives attached to the end. Some growers allow the nuts to fall when ripe and collect them from the ground. For immature coconuts or those intended for seed, bunches are harvested by climbers and brought down using ropes to prevent damage.

Nuts to be sold without their outer casing are husked in the field. Mature, husked coconuts are sold in 75 to 80-pound plastic or burlap bags of 40 to 50 coconuts each, or in plastic mesh bags of 12 coconuts each. They are also sold in cartons holding 20 to 25 coconuts or even single-piece cartons of 6 to 16 nuts each. Copra is sold fresh-cut in over-wrapped trays or plastic bags, and can be sun or kiln dried, or roasted or smoked. Processors sometimes cut a circular hole into a husked coconut and attach a pull-tab for easy access.

Immature coconuts are trimmed to remove most of the husk and shipped with a flat bottom and exposed eyes. Husking, while economical and convenient for marketing, shortens postharvest storage life to approximately three weeks. Mature coconuts should be cooled after harvest, preventing temperature fluctuations of more than 14°F to prevent cracking. Film-wrapping or waxing can help prevent dehydration and the resulting loss of quality in both mature and immature coconuts. Storage over six weeks will sour the coconut milk.

References: Purdue University, University of Florida IFAS Extension, University of Hawaii.

GRADES AND TOLERANCES

There is no formal grading process for coconuts. Informal grades, based on size and weight, exist but may differ between countries. There are several types of coconut palm, differing in tree structure and fruit color, but all produce the same basic nut.

The United States has no standards for coconuts; USDA recommended inspection procedures call for a visual inspection of the shipment for cracking, drying, or other damage. Guidelines require inclusion of 5 to 10 coconuts from each shipment to be cracked open to inspect for quality and fermented liquid.

Reference: USDA Agricultural Marketing Service.

HEALTH & NUTRITION

Coconut consumed in its various forms is a good source of iron, potassium, and fiber, though it is higher in calories with 86% coming from fat, most of which is saturated. One cup of raw, unsweetened, shredded coconut contains 280 calories with 2.7 grams of protein, 27 grams of fat (24 of them saturated) and 2 milligrams of iron—nearly twice the iron in a serving of kale.

References: Produce Marketing Association, University of Florida IFAS Extension, USDA.