

Persea americana

medang

Miller

Lauraceae

LOCAL NAMES

Amharic (avocado); Burmese (kyese,htaw bat); Creole (zaboka); English (butter fruit,avocado,avocado-pear,alligator pear); Filipino (avocado); French (avocat,avocatier,zaboka,zabelbok); German (Alligatorbirne,Avocadobirne); Indonesian (avokad,adpukat); Khmer (avôkaa); Malay (apukado,avokado); Mandinka (avacado); Pidgin English (bata); Spanish (pagua,aguacate); Swahili (mparachichi,mpea,mwembe mafuta); Thai (awokado); Trade name (medang); Vietnamese (bo,lê dâu)

BOTANIC DESCRIPTION

Persea americana is a medium to large tree, 9-20 m in height. The avocado is classified as an evergreen, although some varieties lose their leaves for a short time before flowering. The tree canopy ranges from low, dense and symmetrical to upright and asymmetrical.

Leaves are 7-41 cm in length and variable in shape (elliptic, oval, lanceolate). They are often pubescent and reddish when young, becoming smooth, leathery, and dark green when mature.

Flowers are yellowish green, and 1-1.3 cm in diameter. The many-flowered inflorescences are borne in a pseudo-terminal position. The central axis of the inflorescence terminates in a shoot.

The fruit is a berry, consisting of a single large seed, surrounded by a buttery pulp. It contains 3-30% oil (Florida varieties range from 3-15%). The skin is variable in thickness and texture. Fruit colour at maturity is green, black, purple or reddish, depending on variety. Fruit shape ranges from spherical to pyriform, and weigh up to 2.3 kg.

BIOLOGY

Varieties are classified into A and B types according to the time of day when the female and male flower parts become reproductively functional. New evidence indicates avocado flowers may be both self- and cross-pollinated. Self-pollination occurs during the second flower opening when pollen is transferred to the stigma while cross-pollination may occur when female and male flowers from A and B type varieties open simultaneously. Self-pollination appears to be primarily caused by wind, whereas cross-pollination may be effected by large flying insects such as bees and wasps. Varieties vary in the degree of self- or cross-pollination necessary for fruit set. Some varieties, such as 'Waldin', 'Lula' and 'Taylor' fruit well in solid plantings. Others, such as 'Pollock' and 'Booth 8' (both B types) do not, and it is probably advantageous to plant them in rows alternating with other varieties (A types) which bloom simultaneously to facilitate adequate pollination.



Fruits (AFT team)



Fruit cluster (Trade winds fruit)



Foliage (Trade winds fruit)

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ECOLOGY

West Indian and some hybrid varieties are best adapted to a lowland tropical climate and relatively frost-free areas of the subtropics. Mexican varieties are more cold tolerant and not well adapted to lowland tropical conditions. Guatemalan x Mexican hybrids are generally more cold tolerant than West Indian x Guatemalan hybrid varieties. Some of the more cold-tolerant varieties in Florida include 'Brogdon', 'Gainesville', 'Mexicola', and 'Winter Mexican'. However, it may be difficult to find plants of these varieties. Moderately cold-tolerant types include 'Tonnage', 'Choquette', 'Hall', 'Lula', 'Taylor', 'Monroe', and 'Brookslate'. Varieties with little cold-tolerance include 'Simmonds', 'Pollock', 'Dupuis', 'Nadir', 'Hardee' and 'Waldin'.

BIOPHYSICAL LIMITS

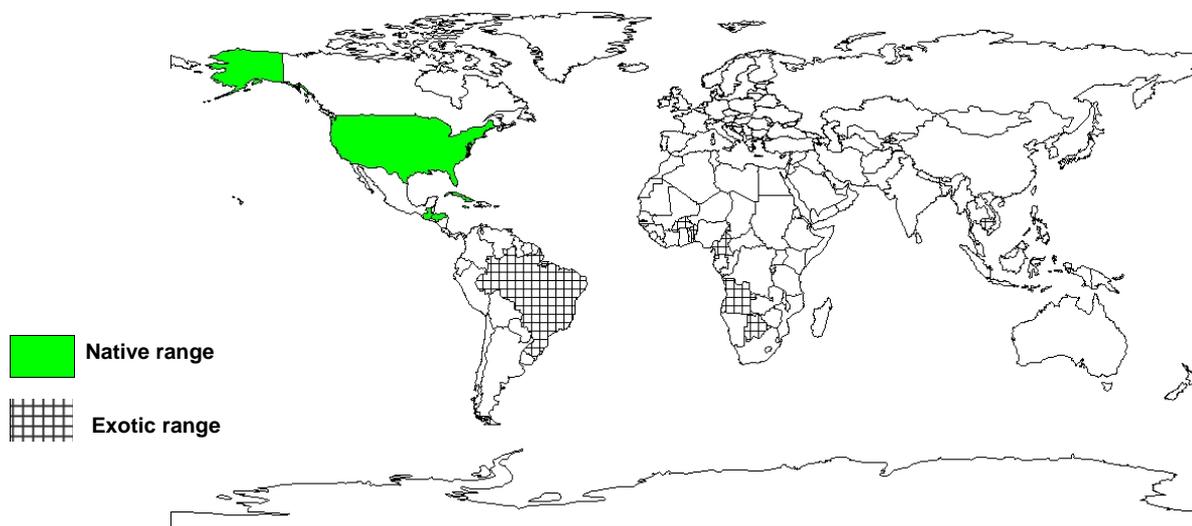
Altitude: 0-2 500 m, Mean annual temperature: -4 to 40 deg. C, Mean annual rainfall: 300-2 500 mm

Soil type: Requires a well-drained aerated soil because the roots are intolerant of anaerobic conditions; waterlogging for more than 24 hours can kill trees. A pH of 5-5.8 is optimal for growth and fruit yield.

DOCUMENTED SPECIES DISTRIBUTION

Native: Antigua and Barbuda, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Guatemala, Honduras, Jamaica, Puerto Rico, St Lucia, St Vincent and the Grenadines, Trinidad and Tobago, US, Virgin Islands (US)

Exotic: Angola, Benin, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, Congo, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Egypt, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Haiti, India, Indonesia, Israel, Kenya, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mexico, Mozambique, Namibia, Niger, Nigeria, Papua New Guinea, Rwanda, Sao Tome et Principe, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Thailand, Togo, Uganda, Vietnam, Zambia, Zanzibar, Zimbabwe



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS

Food: The tree is grown for its nutritious fruit that has long been important in the diets of the people of Central America. Consumption is most often as an uncooked savoury dish mixed with herbs and/or spices, as an ingredient of vegetable salads, or as a sweetened dessert. However, its texture and colour can be used to enhance the presentation and consumption of many foods. Cooking impairs flavour and appearance of avocados.

The flesh represents 65-75% of the total fruit weight. The contents vary widely in different cultivars. The approximate content per 100 g of edible portion are: water 65-86 g, protein 1-4 g (unusually high for fruit), fat 5.8-23 g (largely mono-saturated and documented as an anti-cholesterol agent), carbohydrates 3.4-5.7 g (of which sugars only 1 g), iron 0.8-1 g, vitamin A and vitamin B-complex 1.5-3.2 mg. The energy value is 600-800 kJ/100 g. The high oil content of the mature fruit gives the flesh a buttery texture which is neither acid nor sweet. The easily digestible flesh is rich in iron and vitamins A and B; providing a highly nutritious solid food, even for infants.

Fodder: Surplus fruit is an important food source for pigs and other livestock.

Apiculture: Bees, important for pollination and honey production, visit the avocado tree. The honey produced is dark with a heavy body.

Timber: Wood of *Persea* has been used for house building (especially for house posts), light construction, furniture, cabinet making, agricultural implements, carving, sculptures, musical instruments, paddles, small articles like pen and brush holders, and novelties. It also yields a good-quality veneer and plywood. More popular for its fruits the wood of avocado is seldom used. The wood is brittle and susceptible to termite attack.

Lipids: The pulp and the seeds contain fatty acids, such as oleic, lanolic, palmitic, stearic, linoleic, capric and miristic acid which constitutes 80% of the fruits fatty content. The oil is used by the cosmetic industry in soaps and skin moisturizer products.

Essential oil: Watery extracts of the avocado leaves contain a yellowish-green essential oil.

Medicine: Recently anti-cancerous activity has been reported in extracts of leaves and fresh shoots of avocado. Oil extracted from the seeds has astringent properties, and an oral infusion of the leaves is used to treat dysentery. The skin of the fruit has anti-helminthic properties. The avocado is also said to have spasmolytic and abortive properties. The seed is ground and made into an ointment used to treat various skin afflictions, such as scabies, purulent wounds, lesions of the scalp and dandruff. The flesh is also used in traditional medicine.

Poison: The unripe fruit is poisonous and the ground-up seed mixed with cheese is used as a rat and mouse poison.

TREE MANAGEMENT

Planting distances depend on soil type and fertility, current technology, and economic factors. In commercial groves, trees are planted from 5-7 m in rows and 7-9 m between rows. Pruning during the first 2 years encourages lateral growth and multiple framework branching. Commercially, after several years of production it is desirable to occasionally reduce canopy width of the trees to 5-6 m, to reduce spraying and harvesting costs and reduce storm damage. Severe topping and hedging do not injure trees. Planned tree removal is an option that should be seriously considered for commercial plantings.

An avocado tree grown for its fruit production should either be from budded or grafted trees that will produce fruit within 2 or 3 years as compared to the 8-10 or more years required of seedling avocados. The fruit does not generally ripen until it falls or is picked from the tree. Strong winds or a heavy crop easily breaks limbs.

GERMPLASM MANAGEMENT

The seeds are recalcitrant; lowest safe mc is 57% mc for slow-drying, 57.4% mc for rapid drying; are only viable for 2-3 weeks after removal of the fruits. Storage is however possible in using several methods such as, 8 months in dry peat at 5 deg. C provided they are not permitted to dry out, or for several months by dusting seeds with copper fungicide and storing in damp sawdust or peat in airtight bags at 4-5 deg. C. A germination percentage of 53-75% was observed after 1 year in moist storage and fungicide at 4.4 deg. C.

PESTS AND DISEASES

Many insect pests attack avocados but they seldom limit fruit production significantly. Currently, the most important insect pests are avocado looper (*Epimecis detexta*), pyriform scale (*Protopulvinaria pyriformis*), dictyospermum scale (*Chrysomphalus dictyospermi*), avocado red mites (*Oligonychus yothersi*), borers (*Ambrosia* beetles, *Xylosandrus* spp.), avocado lace bugs (*Acysta perseae*), and red-banded thrips (*Selenothrips rubrocinctus*). Successful control of foliar and fruit diseases caused by fungi requires that all susceptible parts of the plant be thoroughly coated with the fungicide before infection occurs. Sprays must be re-applied as new tissues become exposed by growth and as spray residues are reduced by weathering.

Trees in areas with poorly drained soils and/or which are subject to flooding are likely to be affected by avocado root rot. This is the most serious disease in most avocado-producing areas of the world. Although many trees are infected with the fungus, the disease only appears to be serious if trees are subjected to flooded conditions. Leaves of infected trees may be pale green, wilted, and necrotic and terminal branches die back in advanced stages of the disease. Feeder roots become darkened and decayed and severely affected trees usually die.

Sun-blotch (caused by a viroid) where symptoms of infection include sunken yellow or whitish streaking or spotting and distortion of twigs, leaves, and fruit, is transmitted through buds, seeds, and root-grafting of infected trees. There is no control for this disease, and infected trees should be destroyed. Algal leaf spot whose symptoms appear first on upper leaf surfaces as green, yellowish-green, or rust coloured roughly circular spots. *Diplodia* stem-end rot begins at the stem end of the fruit and develops as the fruit softens. Usually only a problem with immature fruit after harvest and can be prevented by harvesting only mature fruit.

Cercospora spot infection appears on fruits and leaves as small, angular, dark brown spots with a yellow halo, which coalesce to form irregular patches. Fruit lesions are frequently the points of entry for other decay organisms such as the anthracnose fungus.

Avocado scab (the scab fungus) readily infects young, succulent tissues of leaves, twigs and fruit. These tissues become resistant as they mature. Lesions appear as small, dark spots visible on both sides of the leaves. Spots on leaf veins, petioles and twigs are slightly raised, and oval to elongated. Severe infections distort and stunt leaves. Spots on fruits are dark, oval and raised and eventually coalesce to form cracked and corky areas, which impair the appearance but not the internal quality of the fruit. Begin a spray program for scab prevention when bloom buds begin to swell and continue until harvest.

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