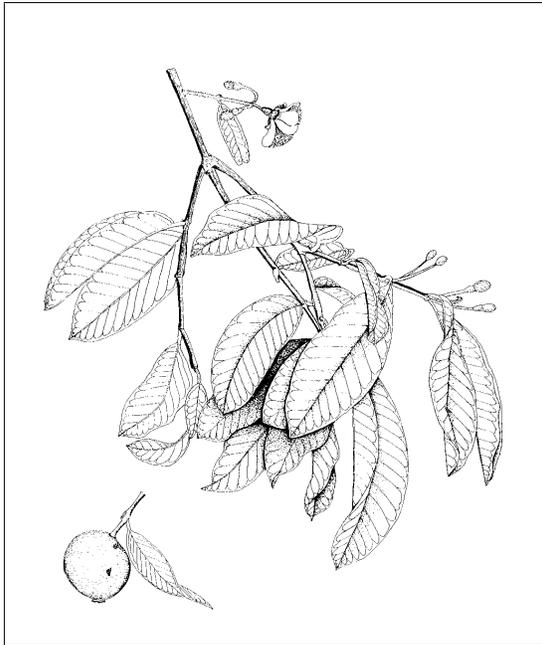


*Psidium guajava* L.  
MYRTACEAE

guava

Synonyms: *Psidium pumilum* Vahl  
*Psidium guajava* L. var. *pumilum* (Vahl) Griseb.  
*Psidium guajava* L. var. *cujavillum* King & Urban



**General Description.**—Guava, also known as guayaba, guayabo, arazá-puitá, goyavier, and gobiabiera, is an evergreen shrub or small tree 2 to 8 m in height and up to 40 cm in diameter at breast height. Plants may have a single stem, especially if crowded in secondary forest, but individuals receiving ample light usually develop secondary stems arising from the main stem near the ground. The branches and stems are usually crooked and have a smoothish, cream to reddish-brown bark between thin, irregular scales that peel off. Guava bark is 5 to 8 mm thick (Pennington and Sarukhan 1968). The sapwood is light brown and the heartwood is reddish brown, hard, heavy (specific gravity of 0.8), and strong (Little and Wadsworth 1964). The roots are slender. The young twigs are four-angled, slightly winged, and green, turning brown with age. The leathery and light green or yellow green opposite leaves have petioles 4 to 7 mm long, and elliptic or oblong blades, 8 to 14 cm long that are short or round pointed at both ends. The foliage is aromatic when crushed. The axillary flowers are usually solitary with four or five white petals. Fruits (berries) are globose or pear-shaped,

with a prominent, persistent calyx. They are at first hard and green, becoming softer, and yellow at maturity and 3 to 5 cm long. Inside the thin rind is a sweet-tart flavored pink or yellow pulp containing many hard, angular, yellow seeds about 2 mm long. The species has  $2n = 21, 22, 30,$  or  $33$  chromosomes (Howard 1989, Liogier 1994, Long and Lakela 1976, Pennington and Sarukhan 1968, Stevens and others 2001).

**Range.**—Guava originated somewhere in the Neotropics and was spread nearly to the extent of its adapted climate before the arrival of Europeans (Morton 1987). Seeds found in Peruvian archeological sites seem to indicate that it originated in that area (Rain-tree 2002). Guava has been planted in nearly every tropical and frost-free subtropical country and has naturalized in most of them (Howard 1989).

**Ecology.**—Guava grows on soils of all textures derived from most parent materials. Well-drained and poorly drained soils, soils with pH's from 4.5 to 9.4, mildly salty soils, and soils both rich and poor in basic cations are tolerated. Guava grows at near sea level in coastal environments up to 2,300 m in elevation in Ecuador (Morton 1987). It grows naturally in areas of Puerto Rico that receive from about 1000 to 3000 mm of mean annual precipitation. Guava withstands drought very well. The species is moderately intolerant of shade. It develops a broad, low crown if open grown, grows a more vertical crown with side shade, and becomes tall and spindly in intermediate crown positions. Saplings can endure a few years in the understory of low basal-area secondary forests. Guava survives the competition of weeds, grass, and brush well. Growth is benefited by root association with arbuscular mycorrhizal fungi (Samarao and Martins 1999). Although they rarely kill the plants, a number of insects and diseases affect the species. As many as 80 percent of unprotected fruits may be attacked by Mediterranean fruit flies (*Ceratitidis capitata* Wied.) (Popenoe 1948). This thin-barked species is easily top-killed by fire and is sensitive to frost (von

Carlowitz 1991).

**Reproduction.**—Guava flowers and fruits nearly throughout the year (Little and Wadsworth 1964). Many individual plants bear just once per year but not necessarily synchronized with other guava plants in the area. Honey bees (*Apis mellifera*) are the chief pollinators (Morton 1987). Time from flowers to ripe fruits ranges from 102 to 124 days (Samson 1986). Thirty-one ripe fruits collected from wild plants in Puerto Rico averaged 32.8 g and ranged from 13.5 to 61.8 g. Air-dried seeds averaged  $0.0079 \pm 0.0001$  g/seed or 127,000 seeds/kg. Sown on moist peat, 63 percent germinated between 15 and 60 days of sowing. Germination was epigeal (author's observation). Birds and mammals disperse the seeds (Invasive Species Specialist Group 2002). Root cuttings are often used for commercial propagation of improved varieties (Morton 1987). Branches and stems layer (root) when they come in contact with moist soil (author's observation), and suckers also arise from roots near the trunk. Established plants coppice readily and withstand repeated cutting (Advisory Committee on Technology Innovation 1983).

**Growth and Management.**—Guava seedlings grow at a moderate rate, but older plants grow more slowly. Under good conditions, guava begins bearing fruits in 3 or 4 years. Plants live 40 years or more (Popenoe 1948). It is probably unwise and unnecessary to plant wild guava because the species is tough and aggressive and often invades agricultural (especially cattle pasture) and forest lands. Control is sometimes attempted, especially in cattle pastures and plantations. Sheep and goats graze the leaves and strip the bark and have been used to control it. Several herbicides are effective in controlling infestations (Pacific Island Ecosystems at Risk 2002). Repeated heavy plowing or repeated burning are also effective measures (Mune and Parham 1956).

**Benefits.**—Guava helps protect the soil and can be a major participant in reforestation of disturbed areas and abandoned pastures. It furnishes food and cover for wildlife. Domestic animals eagerly consume the fruits. Guava is one of the most important fruits in the tropics and is exported to temperate areas. It is consumed fresh and made into juice, jams and jellies, and paste or "cheese." The fruit rinds are candied or stewed in syrup. Nearly all the commercial production comes from improved varieties with large fruits and few seeds. The ripe fruits contain the following components:

water 84 percent, ash 0.7 percent, protein 0.8 percent, fiber 5.6 percent, total sugars 5.4 percent, starch 2.5 percent, and fat 1.0 percent (Popenoe 1948). The fruit pulp is rich in vitamins A and C (Morton 1987). Guava wood is used for tool handles, carving, and fuel (Advisory Committee on Technology Innovation 1983). In folk medicine, extracts of roots, bark, and leaves are used to treat gastroenteritis, vomiting, diarrhea, dysentery, wounds, ulcers, toothache, coughs, sore throat, inflamed gums, and a number of other conditions (Morton 1987). Guava leaf tea is widely used to control blood sugar of diabetics in Japan and elsewhere. It has been shown to be effective *in vitro*, in mice, and in human volunteers (Deguchi and others 1998). The basis for herbal treatment of diarrhea was established by demonstrating inhibition of eight bacteria species and amoebas, and antispasmodic activity (Tona and others 1999).

## References

- Advisory Committee on Technology Innovation 1983). Firewood crops. Vol. 2. National Academy of Sciences, National Academy Press, Washington, D.C. 92 p.
- Deguchi, Y., K. Osada, K. Uchida, H. Kimura, M. Yoshikawa, T. Kudo, H. Yasui, and M. Watanuki. 1998. Effects of extract of guava leaves on the development of diabetes in the db/db mouse and on the postprandial blood glucose of human subjects. *Nippon Nogeikagaku Kaishi* 72(8): 923-931.
- Howard, R.A. 1989. Flora of the Lesser Antilles, Leeward and Windward Islands. Vol. 5. Arnold Arboretum, Harvard University, Jamaica Plain, MA. 604 p.
- Invasive Species Specialist Group. 2002. Notes from Jim Space on his survey of invasive plant species in Tonga. The World Conservation Union. [http://www.issg.org/features/invasives\\_on\\_tonga.html](http://www.issg.org/features/invasives_on_tonga.html). 4 p.
- Liogier, H.A. 1994. Descriptive flora of Puerto Rico and adjacent Islands. Vol. 3. Editorial de la Universidad de Puerto Rico. Río Piedras, PR. 461 p.
- Little, E.L., Jr. and F.L. Wadsworth. 1964. Common trees of Puerto Rico and the Virgin Islands. Agriculture Handbook 249. U.S. Department of Agriculture, Washington, DC.

- 548 p.
- Long, R.W. and O. Lakela. 1976. A flora of Tropical Florida. Banyon Books, Miami, FL. 962 p.
- Morton, J. 1987. Guava. In: J.F. Morton. Fruits of warm climates. Julia F. Morton, Maimi, FL. p. 356-363.
- Mune, T.L. and J.W. Parham. 1956. Weed control: Guava and its control in Fiji. Agricultural Journal, Fiji 27(3/4): 103-108.
- Pacific Island Ecosystems at Risk. 2002. *Psidium guajava* L., Myrtaceae. [http://hear.org/pier\\_v3.3/psgua.htm](http://hear.org/pier_v3.3/psgua.htm). 4 p.
- Pennington, T.D. and J. Sarukhan. 1968. Arboles tropicales de México. Instituto Nacional de Investigación Forestales, Secretaría de Agricultura y Ganadería. Ciudad de México, México. 413 p.
- Popenoe, W. 1948. Manual of tropical and subtropical fruits. Hafner Press, New York. 474 p.
- Rain-tree. 2002. Guava. Raintree Nutrition, Inc., Austin, Texas. <http://www.rain-tree.com/guava.htm>. 5 p.
- Samarao, S.S. and M.A. Martins. 1999. Influence of arbuscular mycorrhizal fungi, associated with addition of rutin, on the growth of guava (*Psidium guajava* L.). Revista Brasileira de Fruticultura 21(2): 196-199.
- Samson, J.A. 1986. Tropical fruits. 2<sup>nd</sup> ed. Longman Scientific & Technical, Harlow, UK. 336 p.
- Stevens, W.D., C. Ulloa-U., A. Pool, and O.M. Montiel, eds. 2001. Flora de Nicaragua. Monographs in Systematic Botany Vol. 85, No. 2. Missouri Botanical Garden, St. Louis, MO. p. 945-1,910.
- Tona, L., K. Kambu, K. Mesia, K. Cimanga, S. Apers, T. de Bruyne, L. Pieters, J. Totte, A.J. Vlietinck, and T. de Bruyne. 1999. Biological screening of traditional preparations from some medicinal plants used as antidiarrhoeal in Kinshasa, Congo. Phytomedicine 6(1); 59-66.
- von Carlowitz, P.G. 1991. Multipurpose trees and shrubs: Sources of seeds and inoculants. International Council for Research in Agroforestry, Nairobi, Kenya. 328 p.
- 
- John K. Francis, Research Forester, U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, Jardín Botánico Sur, 1201 Calle Ceiba, San Juan PR 00926-1119, in cooperation with the University of Puerto Rico, Río Piedras, PR 00936-4984