

Canarium ovatum

pili, Kedongdong

Engl.

Burseraceae

LOCAL NAMES

English (pilinut, Philippine nut, canarium melioides); Filipino (pili-pilauai, pili, pilauai, liputi, basiad, anangi); Trade name (pili, Kedongdong)

BOTANIC DESCRIPTION

Canarium ovatum is an attractive, symmetrically shaped evergreen tree, up to 20 m tall and 50 cm in diameter. Stipules persistent, deltoid to lingulate, 5-20 x 3-10 mm.

Leaves 2-4-jugate, imparipinnate, spirally arranged, about 40 cm long; leaflets ovate to elliptic, 4-24 x 2-12 cm, stiff, coriaceous, entire, base oblique, rounded to subcordate, apex abruptly acuminate, 8-12 pairs of nerves.

Inflorescence axillary, close together at the ends of branches, narrowly thyrsoid, 3-12 cm long, few flowers; flowers trimerous, unisexual, subsessile, pubescent, up to 12 mm long, calyx cupular, 7 mm long in male, 8-9 mm in female flowers; petals 2 x 1 cm; stamens 6, slightly adnate to the disk and sterile in female flowers; pistil absent in male flowers, 7 mm long in female.

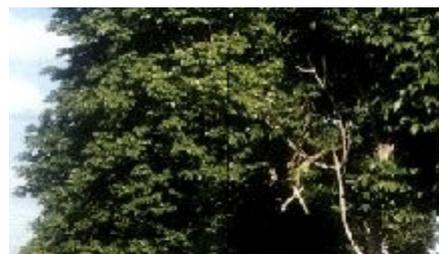
Fruit drupaceous, ovoid to ellipsoid, 3.5-6.25 x 2-2.75 cm, acute, triangular in cross-section; exocarp thin, glabrous, shiny, turning from light green to purplish-black; mesocarp fibrous, fleshy, thick and greenish-yellow in colour; endocarp (shell) elongated, stony, trigonous, pointed at base, blunt or obtuse at apex, tawny to dirty brown, sterile cells strongly reduced. Seed with 1 brown papery seed coat. Much of the kernel weight is made up of the cotyledons, which are about 4.1-16.6% of the whole fruit.

The genus name *Canarium* comes from the vernacular name 'kenari' in the Molucca Isles.

BIOLOGY

Functional hermaphrodites exist in *C. ovatum*. The inflorescences emerge from the leaf axils of the current season's growth so that flowering coincides with the annual flush, in the Philippines between March and June. In both male and female trees, the order of blooming of the flowers in the inflorescence is basipetal. Anthesis of male as well as female flowers takes place between 4 and 6 p.m. Anthers dehisce and stigma becomes receptive at anthesis or immediately after it. The flowers are insect pollinated. Fruit set is about 85%.

If pollination is successful the ovary begins to enlarge after 1 week and the petals start to drop off. Fruit growth lasts 10 months and follows a sigmoid curve, during which the short, dark green fruitlet ripens into an oblong, purplish-black fruit. On average, seedling trees start producing fruit 5-6 years after planting. Clonal trees bear fruit 3-4 years after planting.



Roadside tree (Rafael T. Cadiz)



Canarium ovatum Flower (Rafael T. Cadiz)



Canarium ovatum fruit (Rafael T. Cadiz)

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ECOLOGY

Pili is a tropical tree preferring warm temperatures and well-distributed rainfall. It cannot tolerate the slightest frost or low temperature. In its natural habitat it grows at low to medium altitudes in primary and secondary forests. Mature trees can resist strong winds.

BIOPHYSICAL LIMITS

Altitude: 0-500 m, Mean annual rainfall: 2 500-5 000 mm, Mean annual temperature: 24-32 deg.C

Soil type: Pili grows well on both light and heavy soils. Prefers deep, fertile, well-drained soil.

DOCUMENTED SPECIES DISTRIBUTION

Native: Philippines

Exotic: Australia, United States of America



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 most important product from *C. ovatum* is the kernel. When raw, its flavour resembles roasted pumpkinseed, and when roasted, its mild, nutty flavour and tender, crispy texture are superior to the almond. It has been recorded that the testa should be removed before the kernel is eaten, because it causes diarrhoea. Pili kernel is also used in chocolate, ice cream and baked goods. Nutritionally, the kernel contains 71.1% fat, 11.4% protein and 8.4% carbohydrates; it is high in calcium, phosphorus and potassium. The kernel is a major ingredient in a famous Chinese festive dessert known as the 'moon cake'. However, kernels from some trees may be bitter, fibrous or have a turpentine odour.

Young shoots are used in salads, and the fruit pulp is eaten after it is boiled and seasoned. Boiled pili pulp resembles the sweet potato in texture, it is oily (about 12%) and is considered to have food value similar to the avocado. Pulp oil can be used for cooking.

Fuel: The hard and thick shell that encloses the kernel makes an excellent fuel for cooking. The resin-rich wood makes good firewood.

Gum or resin: A valuable resin, called Manila elemi or 'breabianca', is used as an ingredient in the manufacture of plastics, printing inks and perfumes. It is also used by the Spaniards for ship repairs.

Lipids: An edible light-yellow oil expressed from the kernel is comparable in quality to that of olive oil, containing up to 59% oleic glycerides and 32-59% of palmitic glycerides. Pulp oil can be extracted and used as a substitute for cottonseed oil in the manufacture of soap and edible products.

Medicine: Resin is soft, odorous and has the texture of honey. It was formerly exported for the European pharmaceutical trade as Manila or Philippine gum elemi for use as an ointment for healing wounds and as a plaster. Raw nuts are a purgative.

Other products: Polished and varnished, the stony thick shell becomes an attractive ornament.

SERVICES

Shade or shelter: The evergreen *C. ovatum* tree makes an excellent windbreak as it resists strong winds and even typhoons.

Soil improver: Stony shells are excellent as a porous, inert growth medium for orchids and anthuriums.

Ornamental: With its symmetrical branches, *C. ovatum* is an attractive avenue tree.

TREE MANAGEMENT

Production is mainly from wild trees and small plantings near coconut and hemp plantations. Most of the production in the Philippines is from seedling-raised trees; there is much variation in kernel quality and quantity between the trees. A mature pili tree yields between 100-150 kg of unshelled nuts.

GERMPLASM MANAGEMENT

Refrigeration of seeds at 4-13 deg. C results in loss of viability after 5 days. Nuts in the shell, with 2.5-4.6% mc, can be stored in the shade for 1 year without deterioration of quality. Seed germination is highly recalcitrant, reducing from 98 to 19% after 12 weeks of storage at room temperature; seeds stored for more than 137 days did not germinate.

PESTS AND DISEASES

C. ovatum is generally disease and pest free. However anthracnose of young seedling shoots has been observed, but fungicides easily control this. Maturing fruits are often found coated with algal growth, but apart from marring the appearance of the skin, this does not affect the pulp or the kernel.

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FURTHER READNG

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SUGGESTED CITATION

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