



Cananga odorata (ylang-ylang)

Annonaceae (custard-apple family)

canang odorant (French); *chiráng, irang* (Palau); *derangerang, derangirang* (Nauru); *ilabnglabng, ilanlang* (Kosrae); *ilang-ilang, alang-ilang* (Guam, CNMI); *ilangilang, lengileng, alangilang, pur-n-wai, pwurenwai, seir en wai* (Pohnpei); *ilanilan* (Marshall Islands); *lanalana* (Hawai'i); *makosoi, mokohoi, makasui, mokosoi* (Fiji); *mohokoi* (Tonga); *moso'oi* (Samoa); *moto'i* (Society Islands); *moto'oi, mata'oi, mato'oi* (Cook Islands, Niue, Tahiti); *motoi* (Marquesas–Nukuhiva, Niue); *mutui* (Marquesas–Fatuhiva); *pwalang* (Puluwat Atoll); *pwanang, pwuur, pwalang* (Chuuk); *sa'o* (Solomon Islands: Kwara'ae); *ylang ylang, perfume tree, cananga* (English)

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IN BRIEF

Distribution Common throughout Polynesia, Micronesia, and Melanesia; also present throughout its native Indo-Malayan region, and now distributed pantropically.

Size Typically reaches 10–20 m (33–66 ft), with long drooping branches or twigs.

Habitat Lowland, humid tropics, 0–800 m (0–2600 ft) with rainfall of 700–5000 mm (30–200 in).

Vegetation Associated with many cultivated tropical plants.

Soils Prefers light and medium texture soils; tolerates shallow and temporarily waterlogged soils.

Growth rate Fast growing; can exceed 5 m/yr (16 ft/yr).

Main agroforestry uses Homegardens.

Main products Flowers for adornment or oil distillation, timber.

Yields A cultivated tree in full production can yield 20–100 kg (44–220 lb) of flowers per year.

Intercropping Tolerates shade and grows well together with other crops.

Invasive potential Slight; has naturalized in areas where introduced in the Pacific islands, although it is rarely considered a pest.



Ylang-ylang tree about 9 m (30 ft) in height. Hospital Road, Guam.

INTRODUCTION

Of Southeast Asian origin, *Cananga odorata*, commonly known as ylang-ylang, is a medium-size tree that has been introduced into many islands in the Pacific for its fragrant flowers. This species is often found growing spontaneously in secondary forests and agroforests, where it regenerates easily. It is also a common garden ornamental. In Madagascar and the Comoro Islands, ylang-ylang is valued as the source for ylang-ylang oil, which figures prominently in the perfume industry and aromatherapy.

DISTRIBUTION

Native range

Ylang-ylang is native to Indo-Malaysia and has been widely introduced by Polynesians, Micronesians, and early European explorers into many islands in the Pacific, where in some places it has become naturalized (e.g., Samoa).

Current distribution

There is a degree of uncertainty concerning the antiquity of ylang-ylang in Polynesia. Whistler (1991) noted that the species was probably present in Samoa in pre-European times, but because the Cook expeditions did not visit Samoa, and the species was not collected in western Polynesia until 1839, its status is not clear. Thaman et al. (1994) consider the species to be an aboriginal introduction into Polynesia. Thaman (1993) also suggested that the species is possibly native to the Solomon Islands and the Caroline Islands. However, Fosberg et al. (1979) stated that the species is a European introduction into various places in Micronesia. Moreover, the species is not listed for Yap State, but it is found on the other high islands of Micronesia (Fosberg et al. 1979, Merlin et al. 1996). According to Merlin et al. (1992), this species is a recent introduction to Pohnpei, occurring with early European contact, and is also believed to be a recent (European) introduction to Nauru and the Mariana islands. It was introduced into Guam from the Philippines (Stone 1970). The species is also classified as a recent introduction in New Caledonia (MacKee 1985). It has also been introduced to tropical America (e.g., Costa Rica).

In the Pacific, ylang-ylang is now found in the Mariana Islands (Saipan, Rota, Guam), Nauru, Caroline Islands (Palau, Koror, Faraulep, Chuuk, Pohnpei, Puluwat Atoll), Fiji, Tonga, Samoa, New Caledonia (rare), Hawai'i (rare), Cook Islands, Marquesas Islands, and many other small islands.

BOTANICAL DESCRIPTION

Preferred scientific name

Cananga odorata (Lam.) Hook. F. & Thoms.

Family

Annonaceae (custard-apple family)

Non-preferred scientific names

Canangium fruticosum Craib

Canangium odoratum (Lam.) Baill. ex King

Canangium scortechinii King

Uvaria odorata Lam.

Common names

Oceania

canang odorant (French)

chirang, irang (Palau)

derangerang, derangirang (Nauru)

ilahnglahng, ilanlang (Kosrae)

ilang-ilang, alang-ilang (Guam, CNMI)

ilangilang, lengileng, alangilang, pur-n-wai, p'wurenwai, seir en wai (Pohnpei)

ilanilan (Marshall Islands)

lanalana (Hawai'i)

makosoi, mokohoi, makasui, mokosoi (Fiji)

mohokoi (Tonga)

moso'oi (Samoa)

moto'i (French Polynesia)

moto'oi, mata'oi, mato'oi (Cook Islands, Niue, Tahiti)

motoi (Marquesas–Nukuhiva, Niue)

mutui (Marquesas–Fatuhiva)

p'walang (Puluwat Atoll)

p'wanang, p'wuur, p'walang (Chuuk)

sa'o (Solomon Islands: Kwara'ae)

ylang ylang, perfume tree, cananga, cadmia (English)

Other regions

apurvachampaka, chettu sampangi, karumugai (India)

ilang-ilang, alang-ilang (Philippines)

ilang-ilang, kenanga wood, perfume tree, cananga oil, ylang-ylang (trade names)

kadatngan, kadatnyan (Myanmar)

kernanga (Indonesia)

kenanga, chenanga, ylang-ylang (Malaysia)

Form

Ylang-ylang is of medium size 10–40 m (33–130 ft) in height, although rarely over 30 m (100 ft), and typically 10–20 m (33–66 ft). In cultivation, the tree is usually kept

short by pruning to about 3 m (10 ft). Branches are pendulous or slightly erect with drooping, leafy twigs. The tree is usually quite straggly, often with long, leafy twigs dangling 3–6 m (10–20 ft). There is a single main trunk that is usually bent to some degree. The bark is smooth and grayish white to silvery.

Flowers

It flowers throughout the year in axillary, umbellate hanging clusters of 4–12 flowers. The flower has three sepals and six petals up to 8 cm (2.4 in) long. The petals are twisted when young, then limp and drooping when mature. Flowers are very fragrant, greenish yellow at first, then turning a deep yellow/yellow brown when mature. Merlin et al. (1993) stated that on Kosrae this plant flowers at the same time as other fruit or nut trees, e.g., breadfruit, pandanus, mango, and Tahitian chestnut (*Inocarpus fagifer*). In Madagascar, the trees flower year-round, but mainly during the rainy season from November to March.

Leaves

Leaves are dark green, up to 20 cm (8 in) in length, alternate, simple, entire, elliptic-oblong, slightly pubescent, and with a prominent midrib and drip tip. As with most members of this family, the leaves are arranged mainly along a plane.

Fruit

Greenish black in color, 1.5–2.5 cm (0.6–1.0 in) in length, containing 6–12 stalked fruitlets, fleshy, olive-like, and borne in axillary clusters. There are 6–12, small, pale brown, flattened ovoid seeds in each fruit.

Similar species

Also in the custard-apple family and with the common name ylang-ylang, *Artabotrys hexapetalus* is a climbing woody shrub from India. The flowers are green, with a fragrance similar to those of *Cananga odorata*. However, the flowers of *Artabotrys* are not showy and much smaller, having six 2.5 cm (1 in) long petals that do not twist. Also, *Artabotrys* is a vine, whereas *Cananga* is a tree.

GENETICS

Variability of species

Two groups are distinguished in cultivation. The first group *Cananga* (forma *macrophylla* Steenis) has branches perpendicular to the stem (rather than drooping) and large leaves 20 x 10 cm (8 x 4 in). The flowers of this group are the



Arrangement of leaves. PHOTO: H. MANNER



Flowers at various stages of maturity. PHOTO: C. ELEVITCH



Immature fruits. PHOTO: C. ELEVITCH

source of the distillate traded as cananga oil; it is cultivated in Java, Fiji, and Samoa. The second group is Ylang-ylang (forma *genuina* Steenis) and has drooping branches and

smaller leaves than the first group. This form is the source of the distillate traded as ylang-ylang oil and is cultivated throughout the tropics (Oyen and Dung 1999).

Known varieties

C. odorata var. *fruticosa* (Craib) J. Sincl. is a dwarfed, cultivated form that reaches 2 m (6.6 ft) in height (Backer and Brink Jr. 1963). It often has more numerous and very curly flower petals than usual. This variety is said to never set fruit.

ASSOCIATED PLANT SPECIES

Associated native species

In Indonesia, this species is a component of mixed and teak forests. It is also cultivated for its fragrant flowers in plantations and in backyard gardens as an ornamental.

Species commonly associated in modern times or as recent introduction

It is a commonly planted and spontaneous tree in secondary forests and agroforests in Micronesia and Polynesia. In Pohnpei, this species was cultivated for its essential oil as a plantation or orchard crop at the Ponape Agriculture and Trade School in the mid-1980s. On Guam, ylang-ylang can be found growing in secondary forests containing other introduced species (i.e., *Leucaena leucocephala*, *Spathodea campanulata*, *Areca catechu*, etc.), near roadways.

ENVIRONMENTAL PREFERENCES AND TOLERANCES

Ylang-ylang prefers the humid lowland tropics, although it can be cultivated in the uplands near the equator.

Climate

The tree grows well in the equatorial to subtropical maritime climates of the Indian and Pacific oceans. It is a component of the tropical moist to semi-dry forest.

Elevation range

1–800 m (0–2600 ft); up to 1200 m (3900 ft) near the equator

Mean annual rainfall

700–5000 mm (30–200 in)

Rainfall pattern

Grows in climates with summer, winter, bimodal, and uni-

form rainfall patterns.

Dry season duration (consecutive months with <40 mm [1.6 in] rainfall)

2 months

Mean annual temperature

18–28°C (64–82°F)

Mean maximum temperature of hottest month

28–35°C (82–88°F)

Mean minimum temperature of coldest month

10–18°C (50–64°F)

Minimum temperature tolerated

5°C (41°F) (estimate)

Soils

Ylang-ylang can be found growing in a wide range of soils, from sands to clay loams and clays. It thrives in rich volcanic or fertile sandy soils and tolerates waterlogging for short periods.

Soil texture

It can grow in light, medium and heavy texture soils (sands, sandy loams, loams, and sandy clay loams, clays, clay loams, sandy clays).

Soil drainage

It requires free drainage.

Soil acidity

The tree tolerates wide variation in acidity (pH 4.5–8.0).

Special soil tolerances

Ylang-ylang can grow in shallow and infertile soils. Saline and alkaline soils should be avoided.

Tolerances

Drought

Ylang-ylang can tolerate a short period of drought (less than 2 months).

Full sun

The tree grows best in full sunlight.

Shade

This species is often a component of the understory in traditional agroforestry systems, so moderate shading is tolerated.

Waterlogging

Ylang-ylang tolerates periods of waterlogging, but permanent marshy conditions are not suitable.

Wind

The limbs are brittle and the tree does not handle strong wind well. However, the tree regrows vigorously even after heavy wind damage.

Abilities

Regenerate rapidly

Ylang-ylang is a pioneer species and can colonize open areas rapidly.

Coppice

The tree is often maintained by heavy pruning to a suitable height for picking flowers (usually 3 m [10 ft]) and readily regrows after cutting. Since even a large tree will coppice after being cut down, trees are often felled for their flowers (Merlin et al. 1992). This species will also coppice after severe limb/trunk breakage due to high winds.

GROWTH AND DEVELOPMENT

Ylang-ylang is classified as a fast grower, more than 2 m (6.6 ft) per year in its early years. It is a spontaneous species in secondary forest fallows.

Flowering and fruiting

At sea level, cultivated seedlings can begin flowering in 1.5–2 years at a height of 2 m (6.6 ft). Wild trees do not begin flowering until they reach 9–12 m (30–40 ft) in height. At maturity, the tree can flower and fruit continuously. When younger or where the rainfall is seasonal, the period of flowering and fruiting seems to be closely associated with the rainy months.

Yields

Topped trees of cv. group Ylang-ylang rarely produce more than 20 kg (44 lb) of flowers per year. The flowers yield about 1–2% distilled volatile oil. In Madagascar, mainly at Nosy Bé, 500 ha (1235 ac) produced 800,000 kg (1,760,000 lb) of flowers which yielded 20,000 kg (44,000 lb) of essential oil per year. In the Comoro Islands, 1 ha (2.5 ac) produced 900–1500 kg (1980–3300 lb) flowers equivalent to 18–30 kg (40–66 lb) oil distillate (MweziNet 2000).

Rooting habit

The tree has a long taproot, and therefore favors deep soils.



Grown among other trees, ylang-ylang grows tall, loses its lower branches, and casts a dappled shade. PHOTO: C. ELEVITCH

Reaction to competition

When ylang-ylang is grown in a competitive situation with other species, it grows tall quickly and sheds its lower branches.

PROPAGATION

Ylang-ylang is commonly propagated by seed. It can also be propagated by cuttings, with varying degrees of success. Direct-seeding in the field is also commonly practiced, which avoids damage to ylang-ylang's long taproot. Another method is to collect small seedlings (10–20 cm, 4–8 in) from under trees in the wild, and grow them out in bags for 2–3 months prior to outplanting.

Propagation from seed

Seed collection

As flowering often occurs year-round, ripe fruits can usually be found at any time. Fruits turn from dark green to

black when ripe.

Seed processing

Inside each fruit 2–12 seeds are embedded in an oily flesh. Remove the seeds from the flesh in a sieve under running water. The cleaned seeds should be air-dried in the shade.

Seed storage

The seed is orthodox, meaning it remains viable when dried. Although no data is available, a standard method of storing the dried seeds with desiccant in an airtight container is likely to work well.

Germination

The germination of fresh seeds is said to be erratic. Seeds that are 6–12 months old have a higher germination rate. Hot water treatment has been used successfully to stimulate germination (Oyen and Dung 1999).

Media

A standard light, well drained potting medium is recommended.

Guidelines for outplanting

When the trees have reached an appropriate size for field planting, 20–30 cm (8–12 in) in height, they can be planted out in the field; however, care should be taken not to damage the long taproot.

Direct-seeding

Seeds are commonly direct-seeded. An area is prepared for each planting spot, cleared of weeds, and cultivated to a depth of 50 cm (20 in) if the soil is compacted. Seeds are planted at a depth of 2–3 cm (0.8–1.2 in). Sowing several seeds at each site will allow for selecting the most vigorous seedlings and will help avoid the work of reseeded.

DISADVANTAGES

Potential for invasiveness

Ylang-ylang has become naturalized in many of the Pacific islands where it has been introduced (e.g., Samoa, Pohnpei). The seeds are eaten by birds, bats, monkeys, and squirrels, and are readily dispersed. While the species regenerates spontaneously in cultivated areas and agroforests, it is rarely thought to be a pest and is not considered an invasive species by Pacific Ecosystems at Risk (PIER 2003, PIER 2004).

Pests and diseases

Little is known about pests and diseases of ylang-ylang and none are currently reported from the Pacific islands. Reported problems include stem borers, flower-eating beetles, and insects that cause leaves to wilt (Oyen and Dung 1999).

Other disadvantages

For commercial production, the tree requires quite a lot of hand labor for picking, and yields of distilled oil are low. In homegardens, the labor to collect flowers for decoration is rarely an issue. However, the tree does require periodic pruning in order to assure easy access to the flowers.

AGROFORESTRY/ENVIRONMENTAL PRACTICES

Mulch/organic matter

It is a minor source of mulch (Thaman et al. 2000).

Homegardens

Ylang-ylang is particularly appropriate for planting in homegardens. The tree is a rare to common ornamental in homegardens throughout many islands in the Pacific.

Improved fallows

The tree is a pioneer species and has potential for use in improved fallows.

Native animal/bird food

The fruit is a preferred food of pigeons in Guam, Tonga and Samoa (Stone 1970, Thaman and Whistler 1996). The fruit is also eaten by bats, monkeys, and squirrels.

Host plant trellising

It is used as an understory trellis tree for yam (*Dioscorea* spp.) in Pohnpeian agroforests, where it is sometimes ring-barked. Ring-barking causes the upper part of the tree to die and lose its leaves so that the tree functions as a trellis without blocking sunlight.

Ornamental

The tree is ornamental, and its very pleasant fragrance makes it appropriate in landscaping. Regular top pruning may be necessary to keep the tree from growing too tall in an urban setting. The species is used as a street tree in Malaysia.



Ylang-ylang growing in a mixed Samoan homegarden among bananas, coconuts, and other fruit trees. PHOTO: C. ELEVITCH

USES AND PRODUCTS

In the Pacific, this species has multiple uses. The wood is often used for canoe parts, small canoes (Raulerson and Rinehart 1991), furniture, fuelwood, and cordage. More importantly, the fragrant flowers are used to scent coconut oil and in making lei and mwarmwars (headdresses).

Medicinal

The bark is used in Tonga and Samoa to treat stomach ailments and sometimes as a laxative. In Java, the dried flowers are used against malaria, and the fresh flowers are pounded into a paste to treat asthma. A distillate of the flowers is said to have medicinal value by herbalists and aromatherapists. Aromatherapists claim that oil is useful for depression, distressed breathing, high blood pressure, anxiety, as an aphrodisiac, etc.

Flavoring/spice

The distilled oils are sometimes used to flavor beverages and foods.

Timber

The timber is pinkish, yellowish to light gray, non-durable, and vulnerable to termite attack. The wood is coarse textured and straight grained. In Tonga and Samoa it is used for general construction and canoe making. The timber is used for furniture in Cook Islands (Thaman et al. 2000). The wood is also used for lathe turnings, boxes and crates, clogs/wooden shoes, and fishnet floats (Chudnoff 1984).

Fuelwood

The wood is occasionally used for fuelwood.

Craft wood/tools

It is a minor wood for tool handles (Thaman et al. 2000).

Canoe/boat/raft making

The wood is employed in canoe making in Samoa and Tonga (Thaman and Whistler 1996).

Rope/cordage/string

The bark has very minor use for cordage (Thaman et al. 2000). In Sulawesi, the bark is beaten to make coarse rope.

Body ornamentation/garlands

The tree is a very important source of flowers in Micronesia and Polynesia. The very heavily scented flowers are used for garlands, headdresses and other personal adornment.

Cosmetic/soap/perfume

The primary commercial product is the distilled oil for the perfume industry, much of which is shipped to France. Ylang-ylang oil is said to be the basis for Chanel #5 and perfumes by Guerlain. Ylang-ylang is often used as a scent for coconut oil in the Pacific islands. The special name of potea is reserved for this scented oil in Tonga. When used in moderation, the oil is non-toxic and a non-irritant. However, the oil is an allergen and has been removed from some cosmetics. During the mid-1900s, ylang-ylang oil was used in a popular hair pomade manufactured in Hawai'i. Cananga oil mixed with coconut oil is called Macassar oil and used for hair dressing in Southeast Asia.

Ceremonial/religious importance

The tree has minor ceremonial importance (Thaman et al. 2000). While the plant may be a recent introduction to Tonga, ylang-ylang (mohokoi) is categorized there as a culturally important or sacred plant (akau kakala), along with other sacred or culturally important indigenous plants (Thaman et al. 1993).

COMMERCIAL CULTIVATION

The major commercial product is ylang-ylang oil, which has been produced in the Philippines since the early 1900s. The Comoro Islands and Madagascar are major producers of this oil. In the Pacific islands, the tree is mainly grown for flowers to be used in garlands and other personal adornment. Leis from ylang-ylang are commonly sold in Samoa in the marketplace and by children outside dances and nightclubs.

Spacing

Typical spacing in a commercial ylang-ylang plantation is 6 x 6 m (20 x 20 ft). Closer spacing may result in overcrowding and reduced productivity on lower limbs due to shading.

Management objectives and design considerations

To allow for ease of harvesting the flowers, the tree is topped at 3 m (10 ft) after 2–3 years of growth. This allows for plenty of light to reach the branches that droop naturally or are tied down to pegs in the ground. After first opening, the flowers have no fragrance. Most fragrance develops 15–20 days after opening, when the flower has turned from green to yellow. Flowers are best collected in the early morning hours before much of the fragrance dissipates.

Estimated yield

Topped trees of cv. group Ylang-ylang rarely produce more than 20 kg (44 lb) of flowers per year. Yields from cv. group Cananga (grown in Java, Fiji, and Samoa) can reach 30–100 kg (66–220 lb) per year.

On-farm processing methods

The flowers should be distilled immediately after harvesting. If there is a delay, the flowers can be laid out under cover to avoid fermentation, although the delay reduces the quantity of oil extracted. Water or steam distillation is used. Small traditional stills yield about 1% oil, while large modern stills can yield 2%.

Markets

The market for the distilled oil is the French perfume industry and herbalists and aromatherapists in the developed world.



Ylang-ylang plantation at the Ponape Agriculture and Trade School, Pohnpei, where the tree was being grown for its essential oil. FSM, August 1989. PHOTO: H. MANNER

INTERPLANTING/FARM APPLICATIONS

During establishment of ylang-ylang plantations, the young trees are often interplanted with short-term food crops. Also, the tree fits in nicely as an understory species in traditional agroforests, although reduced productivity of flowers can be expected with increased shade.

Example system (Raynor 2004)

Location

Pohnpei, Federated States of Micronesia.

Description

In the mid-1980s, the Ponape Coconut Products company (PCP), which was at that time part of the Ponape Agriculture and Trade School, planted 1 ha (2.5 ac) of ylang-ylang for essential oil to use as perfume in their coconut soap products. The company had been importing ylang-ylang oil for a high price from France and hoped to substitute locally-produced oil. Another 1 ha (2.5 ac) was planted and managed by collaborating farmers, and a distillery was funded by a German group. After 3 years, the project was terminated for several reasons:

1. The yield of flowers at any one time was small, making the distillery operation difficult and inefficient.

- The yield of essential oil was a very small percentage of the flowers by weight (<1%).
- The poor return to farmers (about \$0.50/hour for labor) was a disincentive to harvesting.
- The overall cost of production was greater than the cost of importing the oil.

Crop/tree interactions

About 0.4 ha (1 ac) of the ylang-ylang plantation was intercropped with commercial bananas and black pepper (grown on fern posts), at the same spacing as the trees, to help shade weeds and provide some income while the company waited for the ylang-ylang trees to bear flowers.

Spacing/density of species

The plantation was laid out on a 4 x 4 m (13 x 13 ft) spacing. However, by the end of the project (3 yr) it was obvious that the trees were spaced too closely (branches of adjoining trees were intertwined). Since the project was abandoned, no action was taken and the plantation was allowed to revert to secondary forest.

Local farmers were less enthusiastic about planting new trees, with most converting their plantations to secondary forest, topping the existing wild ylang-ylang trees, and planting yam under the other tree species, which they ring-barked. They also interplanted banana in their plantations.

PUBLIC ASSISTANCE AND AGROFORESTRY EXTENSION

Extension offices for agroforestry and forestry in the Pacific: <http://www.traditionaltree.org/extension.html>

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Cananga odorata (ylang-ylang)

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