

kedongdong, garuga

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**LOCAL NAMES**

Indonesian (garuga); Trade name (kedongdong,garuga)

**BOTANIC DESCRIPTION**

*G. floribunda* is a deciduous, moderately slow growing, medium to large tree to 15-35 m tall. In favourable situations the bole may attain 1.3-1.5 (-2.2) m diameter at breast height (dbh) above buttresses. The crown is spreading, with a feathery appearance, and may be irregularly-shaped, domed or flat-topped. In forest situations the bole is generally long, straight and cylindrical, but short and crooked in the open.

Leaves large, pinnately compound, and crowded in dense spirals at the ends of the branches. Leaflets are arranged in 4-15 pairs along the rachis, with or without a terminal leaflet. The leaf rachis is slightly swollen at the base and up to 35 cm long. Each leaflet is shortly petiolate, somewhat obliquely narrowly ovate to ovate, 38-100 x 11-31(38) mm, lanceolate around the base, margins entire or crenate, gradually tapered to a long-acuminate apex, mid to dark green and shiny above; dull light green and velvety hairy below. Stipules are present at the base of each leaflet, up to 10 x 3 mm, pointing towards the base of the leaf, usually falling as the leaf matures.

Flowers bisexual, in terminal branched erect panicles, up to 15 cm long, conspicuous, with light pink and yellow petals, borne on otherwise bare branches.

Fruits in large clusters born in drooping panicles, held clear of the foliage, somewhat globular to obovoid, 10-15 mm across, green ripening to greenish-blue or purple-black.

Bark light grey brown to grey, smooth with wide evenly spaced conspicuous lenticel protrusions on young trees. With age the bark on the lower bole becomes rough and scaly. The inner bark is pink to red brown in distinct layers grading to white on the wood. When damaged a slight clear to milky, slightly resinous-scented exudate is produced, which becomes sticky on exposure to air.

**BIOLOGY**

Flowering occurs at the end of the dry season or at the beginning of a rainy season and just before the new leaves. In Java *G. floribunda* flowers in June-November and fruits in October-April; in Sulawesi it flowers in September and October; in the Philippines it flowers in March-June and fruits in March-October. The fruits are eaten and dispersed by birds, including Pacific pigeons and fruit doves, and flying foxes.

## Garuga floribunda

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Burseraceae

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### ECOLOGY

*G. floribunda* is most common in areas with a pronounced dry season and occurs in vine thickets, primary and secondary forests, periodically dry or very dry monsoon forests and in lower montane rain forest, often in near-coastal areas, on islands and teak-dominated associations. It can also be found in association with *Gyrocarpus americanus*.

### BIOPHYSICAL LIMITS

Altitude: 5–1200 m

Temperature: 21-26°C

- mean maximum for the hottest month in the range 24-29°C

- mean minimum for the coolest month being 18-23°C.

- absolute minimum temperatures between 0-12°C.

Rainfall: 1000-3500 mm

Soil type: Clay, limestone, sandy and volcanic soils with free drainage. It prefers neutral to acidic soils.

### DOCUMENTED SPECIES DISTRIBUTION

Native: Australia, Bangladesh, China, India, Indonesia, Malaysia, Papua New Guinea, Philippines, Samoa, Solomon Islands, Tonga, Vanuatu

Exotic:



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.

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**PRODUCTS**

**Timber:** The wood of *G. floribunda* is used for general construction, bridge building, posts, light duty flooring, furniture and cabinet work, interior trim, mouldings, shelving, skirting, sporting goods, agricultural implements, boxes and crates, carvings, toys and novelties, and turnery. It is also used for the production of veneer and plywood.

**Food:** The fruit is edible.

**Fuel:** It is appreciated as a hot burning fuelwood in Vanuatu.

**Fodder:** The leaves are used for fodder.

**Tannin or dyestuff:** A decoction of the leaves and bark has been used as a black dye for mats made from *Corypha* leaves.

**Medicine:** The species is widely used in traditional medicine in Vanuatu: the inner bark is used to treat stomach ache and infected cuts. A decoction of the bark has been given after childbirth.

**SERVICES**

**Boundary or barrier:** The species is found in Samoa near garden areas, as live fences around plantations and as boundary markers in the South Pacific.

**Reclamation:** The tree offers considerable potential for reforestation or enrichment planting in degraded, logged-over or cyclone-damaged forests.

**Ornamental:** The tree is also planted as an ornamental or protected species near settlements in the South Pacific countries.

**Shade or shelter:** *G. floribunda* is occasionally planted as a shade tree.

**Other services:** In Samoa, fruits attract pigeons and for that reason the tree is frequented by pigeon hunters, and is a habitat for edible beetles.

**TREE MANAGEMENT**

The species is tolerant of semi-shaded conditions in seedling and juvenile stages, but mature trees are light-demanding. Planting at close spacing is recommended in order to avoid production of large low branches, later intermediate cuttings can be done and ultimately natural regeneration allowed. Very limited information is available on suitable silvicultural and management regimes, either in native forests or plantations, but the species is suited for pollarding. In Vanuatu the recommended minimum diameter cutting limit is 60 cm dbh.

**GERMPLASM MANAGEMENT**

There are about 1,300 fresh fruit per kg. It is preferable to only collect fully mature, blackish fruits, although slightly immature fruits may be sun-ripened for a few days and soaked overnight in water for easy seed extraction. There are 15,500-23,000 seeds per kg. No seed pretreatment is required and fresh seed should be sown in sawdust or potting media in germination trays. Seed storage is intermediate.

**PESTS AND DISEASES**

*G. floribunda* is susceptible to insect attack when grown in open situations. Young plants may be severely defoliated by a white hairy caterpillar. The bole may be attacked by an unidentified species of small beetle. The species is reported to be susceptible to fire, but trees are moderately resistant to cyclones and drought.

*G. floribunda* timber is susceptible to dry-wood termites and liable to stain. The wood is also susceptible to *Lyctus* (powder post beetle) attack.

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**FURTHER READING**

Bolza E. 1975. Properties and uses of 175 timber species from Papua New Guinea and Irian. Division of Building Research, CSIRO, Melbourne, Australia.

Clarke WC, Thaman RR. 1993. Agroforestry in the Pacific Islands: Systems for Sustainability. United Nations University Press.

Curry P. 1995. The Department of Forests Botanic Database. Department of Forests, Port Vila, Vanuatu.

Eddowes PJ. 1977. Commercial timbers of Papua New Guinea, their properties and uses. Forest Products research Centre, Department of Primary Industry, Port Moresby. 195 pp.

Foliga T, Blaffart H, 1995. 20 Western Samoan species. Watershed management and conservation education project working paper. Apia, Samoa: Government of Western Samoa/UNDP/FAO.

George AS (ed.). 1985. Flora of Australia. Volume 25. Melianthaceae to Simaroubaceae. Bureau of Flora and Fauna, Australian Government Publishing Services, Canberra.

Kininmonth JA, 1982. Properties and uses of the timbers of Western Samoa. Indigenous hardwoods. Rotorua, New Zealand: Forestry Research Institute. 56 pp.

Leslie AD. 1994. A compilation of results from forestry trials established on Espiritu Santo, Vanuatu. Technical Booklet No 3, Santo Industrial Forest Plantation Project, Department of Forests, Vanuatu.

Martel F, 1998. Rapid rural assessment survey in Samoa, final report. South Pacific Regional Initiative on Forest Genetic Resources (SPRIG).

Siwatibau S, Bani C, Kaloptap J, 1998. SPRIG Rapid Rural Appraisal Survey of selected tree species in Vanuatu. Report by Island Consulting to CSIRO Division of Forestry/SPRIG Project.

Sosef MSM, Hong LT, Prawirohatmodjo S, eds. 1998. Plant Resources of South-East Asia. No. 5(3). Timber trees: lesser-known timbers. Backhuys Publishers, Leiden.

Wheatley JI, 1992. A guide to the common trees of Vanuatu with lists of their traditional uses & ni-Vanuatu names. 308 pp.

Wheeler JR, Rye BL, Koch BL, Wilson AJG. 1992. Flora of the Kimberley region. Western Australian Herbarium, Department of Conservation and Land Management, Perth, Australia.

Whitmore TC. 1966. Guide to the forests of the British Solomon Islands. Oxford University Press, London.

**SUGGESTED CITATION**

Orwa C, Mutua A, Kindt R, Jamnadass R, Simons A. 2009. Agroforestry Database: a tree reference and selection guide version 4.0 (<http://www.worldagroforestry.org/af/treedb/>)