

# Bischofia javanica

uriam

## LOCAL NAMES

Bengali (kainjal); English (bishop wood,Java cedar); Filipino (tuai); French (bois de l'evêque); Hindi (bhillar,kaen,kot semla,paniala,pankain); Japanese (akagi); Javanese (gintungan); Lao (Sino-Tibetan) (foung fat,khom fat); Tamil (thondi); Thai (pradu-som,toem); Trade name (uriam); Vietnamese (nhoi)

## BOTANIC DESCRIPTION

*Bischofia javanica* is a medium to fairly large, usually deciduous tree, 30-50 m tall, bole straight or poorly shaped, branchless part usually short but sometimes up to 20 m long, up to 80(-170) cm in diameter, sometimes with steep buttresses up to 3 m high; bark fissured and scaly with small, thick shaggy scales, reddish-brown to purplish-brown, inner bark fibrous, spongy, pink, exuding a red sap; crown dense and rounded.

Leaves arranged spirally, pinnately 3-foliolate, glabrous; petiole 8-20 cm long; stipules oblong-triangular, papery, 7-22 mm long, early caducous, leaflets elliptical to ovate, 6-16 cm x 3-10 cm, base rounded to broadly cuneate, apex acuminate, margin finely crenate-serrate, pinnately veined, shiny above, terminal leaflet long-stalked.

Flowers unisexual, actinomorphic, 5-merous, small, greenish, apetalous; disc absent. Male flowers in an axillary, many-flowered, 9-20 cm long panicle; sepals united at base, hooded; stamens 5, free, opposite to the calyx lobes; pistillode broadly peltate and short-stalked. Female flowers in a lax, 15-27 cm long panicle; calyx lobes 5, caducous; staminodes very small; ovary superior, globose, 3(-4) celled, with 2 apical pendulous ovules per cell, style short, with 3 long and spreading to recurved stigmas.

Fruit a globose drupe, indehiscent, 1.2-1.5 cm across, bluish-black, with a horny to leathery pericarp and fleshy mesocarp; cells 1-2 seeded.

Seed oblong to ovoid, about 5 mm long, brown.

The generic name commemorates Prof. G.W. Bischoff of Heidelberg, Germany, 1797-1854.

## BIOLOGY

*B. javanica* is dioecious and flowers annually from 8 years onward. In west Java, flowering usually takes place in August-November (-December) and mature fruits can be found in (January-) February-June with a peak in March. In central Java, the fruiting period is from May to November, and in east Java from November-December.

Blume

Euphorbiaceae



*Bischofia javanica*  
Foliage (Rafael T. Cadiz)



Habit at Deering park, Florida (Forest and Kim Starr)



Habit at Deering park, Florida (Forest and Kim Starr)

**ECOLOGY**

The tree prefers areas with a distinct dry season. It is common but usually found scattered in primary and old secondary dry and deciduous forest or monsoon forest but also in evergreen forest, swamp and teak forest, sometimes in more open places like savanna tracts. It is more frequent on riverbanks, shady ravines and prefers deep loose soils such as sandy, rocky or loamy soils with sufficient water content. In monsoon forest of Timor, it is found in association with *Alstonia scholaris*, *Cordia subpubescens*, *Exocarpos latifolia*, *Ficus saxophila*, *Tetrameles nudiflora* and *Toona sureni*.

**BIOPHYSICAL LIMITS**

Altitude: 0-1 800 m

Soil type: The tree prefers deep, loose soils such as sandy, rocky or loamy soils with sufficient water content, occasionally it is found on limestone.

**DOCUMENTED SPECIES DISTRIBUTION**

Native: Australia, China, India, Japan, Malaysia, Papua New Guinea, Samoa, Thailand, Tonga

Exotic: Kenya, South Africa, Tanzania, Uganda, 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 young soft leaves are cooked and eaten as a vegetable.

Fuel: Although the wood is not suitable as a fuelwood, it is used for charcoal production.

Fibre: The tree is a potential source of long fibres for pulp and paper production.

Timber: Bishop wood is medium-weight and moderately hard. The heartwood is purplish-brown to reddish-brown and is sharply differentiated from the narrow, pale brown to pale reddish-brown sapwood. The density is 520-1 010 kg/m<sup>3</sup> at 15 % moisture content, grain is generally interlocked, texture moderately fine to rather coarse and even, wood surface dull to slightly glossy. Fresh wood smells of vinegar. It is used for general construction (beams, posts), bridges, decking, sleepers, mining props, flooring, interior finish, veneer, plywood, implements, carving etc.

Tannin or dyestuff: A red dye obtained from the bark is used to stain rattan baskets. The bark also contains about 16 % tannin that is employed in the toughening of nets and ropes.

Medicine: *B. javanica* has been shown to have antiulcer, anthelmintic and antidysenteric activities.

**SERVICES**

Shade or shelter: In India, the tree is considered to be an excellent shade tree in coffee and cardamom plantations.

Reclamation: *B. javanica* is used for afforestation.

Ornamental: The tree has been introduced as a fast-growing ornamental in Africa and the USA.

Intercropping: *B. javanica* is often intercropped in traditional agriculture.

**TREE MANAGEMENT**

The tree is well suited for large-scale plantations. In Java, it has been planted in pure stands at 2 m x 3 m, and in mixed plantations in alternating rows with *Calophyllum inophyllum* and *Bombax ceiba* at 1 m x 3 m, and with *Acacia mearnsii* at 2.5 m x 5 m. Self-pruning of thick branches is good once the canopy closes after about 5 years at a spacing of 2 m x 3 m. Closer planting reduces this period. Pruning wounds heal well and the tree survives girdling. In Java, an 8-year-old pure plantation with a spacing of 2 m x 3 m yielded 12 m<sup>3</sup>/ha of clear-bole wood.

**GERMPLASM MANAGEMENT**

There are 61 500-90 000 seeds/kg. Seed storage behaviour is uncertain, viability maintained for 3 months in open storage at room temperature, after which it is reduced. Seed may be collected in large quantities and can be stored for up to 6 months. Seed may be sown under shade or full sunlight, provided water is adequate. Germination starts 1-3 weeks after sowing and after 5-6 weeks about 70 % of the seed have germinated.

**PESTS AND DISEASES**

In Java, young trees are heavily attacked by top and twig-borers, causing failure of plantations in less suitable locations. Caterpillars of *Mtanastris hyrtaca* and *Selepa celtis* feed on the foliage. In Indonesia, *Corticium salmonicolor* and *Glomerella cingulata* of which the conidial state is *Colletotrichum gloeosporoides*, fungi attack the tree. In southern China, the tree suffers severely from witches' broom. The wood is susceptible to *Lyctus* and dry-wood termite attack, longhorn and ambrosia beetles as well as wood-rotting fungi.

**FURTHER READNG**

Bhatnagar AK, Kapil RN. 1974. *Bischofia javanica* - its relationship with Euphorbiaceae. *Phytomorphology*. 23(3-4): 264-267.

FAO. 1983. Food and fruit bearing forest species. 2: Examples from South-Eastern Asia. *FAO Forestry Paper*. 44/2. Rome.

Gupta DR, Dhiman RP, Naithani-S and Ahmed B. 1988. Chemical investigation of *Bischofia javanica* Blume. *Pharmazie*. 43(3): 222-223.

Jin KX. 1983. MLO discovered in witches' broom of *Bischofia javanica*. *Forest Science and Technology Linye Keji Tongxun*. No. 10, 18-19; 2 pl. CAAS.

Kunzel W. 1989. Agroforestry in Tonga: a traditional source for development of sustainable farming systems. *Occasional Paper*. South Pacific Smallholder Project, University of New England. No. 12.

Lemmens RHMJ, Soerianegara I, Wong WC (eds.). 1995. *Plant Resources of South-east Asia*. No 5(2). Timber trees: minor commercial timbers. Backhuys Publishers, Leiden.

Luna R K. 1997. *Plantation trees*. International Book Distributors.

Tanimoto-T, Toyoda-T. 1996. Survivorship and growth of akagi (*Bischofia javanica* B1) seedlings under the forest canopy and different temperature conditions. *Bulletin of the Forestry and Forest Products Research-Institute, Ibaraki*. No. 370, 1-19

**SUGGESTED CITATION**

Orwa C, A Mutua, Kindt R, Jamnadass R, S Anthony. 2009 *Agroforestry Database: a tree reference and selection guide version 4.0* (<http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>)