

## Dipterocarpus grandiflorus

keruing, apitong

### LOCAL NAMES

Burmese (kanyin-byan); Filipino (apitong); Hindi (gurjan); Indonesian (tempudau tunden, lagan bras, aput); Malay (keruing belimbing); Thai (yang-yung); Trade name (keruing, apitong); Vietnamese (d[aa]f[u] d[oj]t t[is]m)

### BOTANIC DESCRIPTION

*Dipterocarpus grandiflorus* is a medium sized to large resinous tree up to 43m tall, bole straight, cylindrical, branchless for up to 30m, up to 135cm in diameter, buttresses absent or few, up to 1.5m high and 1m long, blunt, bark surface slightly fissured, grey or light yellowish.

Leaves ovate, 10-18cm x 5-12cm, base obtuse or subcordate, acumen up to 1cm long, secondary veins 15-17 pairs, glabrous, petiole 3-9cm long, stipules oblong-lanceolate, subacute, outside densely buff pubescent.

Flowers large, actinomorphic, bisexual, scented, nodding; calyx persistent, 5-merous, united round the ovary into a tube, but not fused to it; fruit calyx tube ellipsoid, glabrous, with 5 prominent wings continuous from base to apex, 2 larger fruit calyx lobes up to 22cm x 3cm, 3 shorter ones up to 2cm x 1.5cm; petals large, oblong to narrowly oblong, strongly contorted, loosely cohering at base on falling, cream-white with a prominent stripe down the center; stamens 30, persistent in a ring around the ovary; ovary 3-celled with 2(-3) ovules in each locule, base enclosed in the calyx tube.

Fruit a nut, surrounded by the calyx, comparatively large; fruit calyx tube woody, becoming more or less distinctly constricted into a distal neck as the nut expands, smooth, pustulate, tubercled, ridged, winged or plicate; nut ovoid, with a woody pericarp, tomentose, with a short acute style remnant.

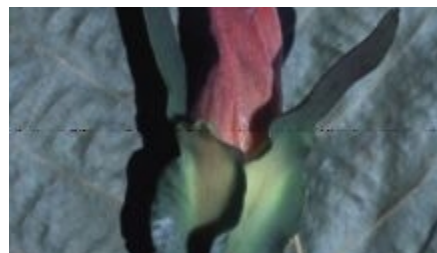
The specific epithet means large-flowered in Latin.

### BIOLOGY

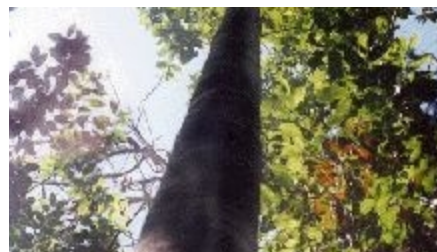
*D. grandiflorus* appears to flower and fruit annually in abundance and with more consistency than any of the other species of the family. The flowering time may vary between countries or regions, due to dissimilarities in climatic and genetic factors. The fruit matures in 3-5 months. In Burma and the Andaman Islands (India) flowering is in January and fruits ripen during May-June. It may begin to flower and bear good seeds before its 30th year. It first flowers at an age ranging from 17 to 36 years. The seeds are usually shed at the start of the wet season.

(Blanco) Blanco

Dipterocarpaceae



*Dipterocarpus grandiflorus* (Chongrak Wachrinrat)



Mature tree: In secondary growth forest in the Philippines, reaching heights of 25-45 m with a diameter of up to 180 cm. (Rafael T. Cadiz)



Bud, flower and seed: (seed body up to 7 cm long). (Rafael T. Cadiz)

# Dipterocarpus grandiflorus

(Blanco) Blanco

Dipterocarpaceae

keruing, apitong

## ECOLOGY

*D. grandiflorus* is common and sometimes semi-evergreen on clay-rich soils and grows in primary semi-evergreen or evergreen forest up to 600m altitude. It is adapted to drought-prone areas in SE Asia.

## BIOPHYSICAL LIMITS

Altitude range: 0 - 600 m

Mean annual rainfall: 900 - 4000 mm

Mean annual temperature: 24 - 28°C

Soil type: *D. grandiflorus* can adapt to many soil types but grows best in deep, well-drained, loamy clay soils of volcanic origin. Likewise, it also grows in relatively fertile soil with 2-10% organic matter, with soil parent materials of limestone, volcanic ash, and basalt. Soil depth up to the C horizon is usually more than a metre, with soil colour from red to yellowish red.

## DOCUMENTED SPECIES DISTRIBUTION

Native: India, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam

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.

## **Dipterocarpus grandiflorus**

(Blanco) Blanco

Dipterocarpaceae

keruing, apitong

---

### **PRODUCTS**

**Fuel:** The wood makes good quality charcoal.

**Fibre:** It is used as pulp for paper production.

**Timber:** *D. grandiflorus* is an important source of keruing timber. The sapwood is yellowish to greying-brown and usually distinctly demarcated from the heartwood, which is greyish-brown to red-brown, usually not distinctly lustrous on planed surfaces. The wood weighs 650-945kg/cu m at 15% moisture content and is very resinous. It is used for medium and heavy construction, agricultural impellents and toys.

**Gum or resin:** The wood yields large quantities of oleo-resin called balau or minyak keruing, it is used locally as a coat for waterproofing paper, caulking baskets and boats, as a varnish for walls and furniture, in preparation of lithographic ink or, sometimes mixed with bark of *Melaleuca* sp. for torches.

**Tannin or dyestuff:** A tannin-formaldehyde adhesive is produced from bark extracts.

### **SERVICES**

**Nitrogen fixing:** The tree is associated with ectomycorrhizal fungi.

**Erosion control:** It minimizes soil erosion on slopes and resultant sedimentation of streams, lakes, and reservoirs.

**Soil improver:** It also improves soil conditions through its fast rate of litter deposition and organic matter decomposition.

**Other services:** *D. grandiflorus* can make up the biggest forest cover component of watersheds. It can store much of the rainwater and regulates its flow on the slopes to streams, lakes, and reservoirs for the irrigation of food crops and the generation of electricity to provide energy for homes and industry.

## **Dipterocarpus grandiflorus**

(Blanco) Blanco

Dipterocarpaceae

keruing, apitong

---

### **TREE MANAGEMENT**

Like most Dipterocarps, *D. grandiflorus* needs partial shade in the early stages of development. Spacing of 2-4m x 3-4m is recommended to attain straight boles. In strip planting, spacing is 2-3m in the strip, and 6-10m between strips. Weeding is necessary during the first three years, thinning should be carried out after 5, 10, 15 and 25 years. In the first 2-3 years, shade trees are used such as *Paraserianthes falcataria* and *Acacia auriculiformis*.

### **GERMPLASM MANAGEMENT**

Seeds of *D. grandiflorus* are generally collected on the ground after they fall because of the difficulty of climbing the tall trees. Seeds are observed to have a short viability (3-5 days), and as such the seeds must be sown as soon as possible. However, *D. grandiflorus* seeds maintain their viability for 8 weeks when stored at 14°C in sealed plastic bags filled with nitrogen gas. Seeds are recalcitrant.

### **PESTS AND DISEASES**

Diseases reported in the Philippines are wilding blight caused by *Botryodiplodia theobromae* and apitong wilt for which the most frequently associated organism is a *Polyporus* sp. In Peninsular Malaysia the fungus *Cylindrocladium scoparium* is pathogenic to seedlings. Insects such as *Alcidodes crassus*, *A. dipterocarpi*, *Nanophyes shoreae* and *Cydia pulverula* may damage seeds.

## **Dipterocarpus grandiflorus**

(Blanco) Blanco

Dipterocarpaceae

keruing, apitong

---

### **FURTHER READING**

Hong TD, Linington S, Ellis RH. 1996. Seed storage behaviour: a compendium. Handbooks for Genebanks: No. 4. IPGRI.

Lee SS and Manap AA. 1982. *Cylindrocladium scoparium* Morgan a new pathogen of some forest tree species in Peninsular Malaysia. *Pertanika*. 5(1): 72-75.

Quiniones SS. 1980. Notes on the diseases of forest trees in the Philippines. *Sylvatrop*. 5(4): 263-271.

Sosef MSM, Hong LT, Prawirohatmodjo S. (eds.). 1998. PROSEA 5(3) Timber trees: lesser known species. Backhuys Publishers, Leiden.

Tongacan AL. 1974. Balau. FORPRIDECOM Technical Note, 147:2pp.

### **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/>)