

## Dalbergia sissoo

sissoo, shisham

Roxb. ex DC.

Fabaceae - Papilionoideae

### LOCAL NAMES

Arabic (dalbergia,sissoo); Bengali (shisu,shishu,sisu); English (Bombay blackwood,sissoo,Indian rosewood,sisso); Hindi (agaru,biridi,tali,gette,kara,shisham,sisam,sissai,sissu,sissoo); Indonesian (pradu-khaek,du-khaek); Javanese (sonowaseso); Nepali (sissau,sisham); Sanskrit (aguru,shinshapa); Spanish (sisu); Tamil (sisuitti,sisso,nukku kattai,yette,gette); Thai (du-khaek,pradu-khaek); Trade name (sissoo,shisham)

### BOTANIC DESCRIPTION

Dalbergia sissoo is a medium to large-sized deciduous tree, growing up to 30 m in height and 80 cm dbh under favourable conditions. Crown wide spreading and thin. Bark thin, grey, longitudinally furrowed, exfoliating in narrow strips. Develops a long taproot from an early age, and numerous lateral ramifying roots.

The leaves are imparipinnate; leaflets 3-5, alternate, 2.5-3.6 cm in diameter, broad ovate, acuminate, glabrescent, petiolules 3-5 mm long.

Flowers 5-8 mm long, pale white to dull yellow, racemes 2.5-3.7 cm long in short axillary panicles.

Pods 5-7.5 cm x 8-13 mm, narrowed at the base, indehiscent, glabrous, with 1-4 seeds. Seeds 6-8 x 4-5 mm, kidney shaped, thin and flat, light brown.

The generic name Dalbergia honours the Swedish brothers Nils and Carl Dalberg, who lived in the 18th century. The former was a botanist and the latter explored Surinam.

### BIOLOGY

At 9 months, D. sissoo starts producing flowers profusely. The small bisexual flowers are borne on small branches from the leaf axis. Little is known of pollination biology and breeding system. The species appears to be insect pollinated, and trees can apparently be both self- and out-crossing to varying degrees, depending on local conditions. Flowering closely follows leaf flushing; leaves fall and young flower buds appear with new leaves followed by complete pod formation and maturity. Mature pods remain attached to the tree for 7-8 months and are then dispersed by wind and water.



Dalbergia sissoo being lopped for fodder in southern Nepal. (Martien Gelens)



Dalbergia sissoo (Chongrak Wachrinrat)

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### ECOLOGY

Abundant moisture and lack of competition are the key to its successful regeneration; it is therefore found in riverine environments where sunlight and moisture are plentiful. Associated with *Pinus roxburghii*, *Acacia catechu* and *Shorea robusta*. *D. sissoo* is adapted to a seasonal monsoon climate and a dry season of up to 6 months.

### BIOPHYSICAL LIMITS

Altitude: 0-1500 m, Mean annual temperature: -4 to 45 deg. C, Mean annual rainfall: 500-4500 mm

Soil type: *D. sissoo* grows well in a wide range of soil types, from pure sand and gravel to rich alluvial soil of riverbanks. However, growth is slow in poorly aerated sites, such as those with heavy clay soils. The pH tolerated is in the range of 5-7.7.

### DOCUMENTED SPECIES DISTRIBUTION

Native: Afghanistan, Bangladesh, Bhutan, India, Malaysia, Pakistan

Exotic: Cameroon, Cyprus, Ethiopia, Ghana, Indonesia, Iraq, Israel, Kenya, Mauritius, Nigeria, Sudan, Tanzania, Thailand, Togo, United States of America, Zimbabwe



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**

**Fodder:** Young branches and foliage form an excellent fodder with a dry-matter content of 32.46%, crude protein 2.7-24.1%. The foliage has normally been used as emergency feed when other fodder sources fail.

**Apiculture:** A useful source of honey but the flowers are only lightly attached to the flower branch and fall easily. The bees are therefore not able to take full advantage of the large number of flowers. The honey produced is dark amber with a strong flavour.

**Fuel:** The species is fast growing, hence suitable for firewood. Sapwood and heartwood have calorific values of 4.9 and 5.2 kcal/g respectively.

**Fibre:** Sulphate pulp from wood is used in producing writing and printing paper.

**Timber:** *Dalbergia sissoo* is one of the most useful timber species of India. The heartwood is very hard and close grained with a specific gravity of 0.62-0.82. It seasons well and does not warp or split; it is extremely durable and is one of the timbers least susceptible to dry-wood termites in India. Wood offers resistance to sawing and cutting but is excellent for turnery, takes a good polish and finishes to a smooth surface. It is used for high-quality furniture, cabinets, decorative veneer, marine and aircraft grade plywood, ornamental turnery, carving, engraving, tool handles and sporting goods. Its root wood is used for tobacco pipes. In village industry, *D. sissoo* is popular for doors and windows.

**Tannin or dyestuff:** *Dalbergia sissoo* pods contain 2% tannin.

**Lipids:** Heartwood yields light brown, viscous, non-drying fixed oil (5.35%), suitable as a lubricant for heavy machinery.

**Poison:** *Dalbergia sissoo* is reported to have pesticidal properties. Aqueous extracts from the leaves, stems and roots inhibit the reproduction, growth and development of the insect pest *Utethesia pulchella*. Mixed with *Azadirachta indica* oil cake, sawdust from *D. sissoo* reduces egg laying and increases larval mortality in *Melodogyne javanica*. Methanol extract from the roots has insecticidal properties, especially against *Diacrisia obliqua*, *Spodoptera litura* and *Argina cubrania*.

**Medicine:** Oil obtained from the seeds is used to cure skin diseases. The powdered wood, applied externally as a paste, is reportedly used to treat leprosy and skin diseases. The roots contain tectoridin, which is used medicinally.

**SERVICES**

**Shade or shelter:** Used as a windbreak in mango, coffee and tea plantations. These shade-loving crops also benefit from improved soil fertility under *D. sissoo*.

**Reclamation:** Due to its vigorous reproduction through suckers, it is useful for stabilizing eroding sites. It is therefore found in a variety of wastelands, like in south Asia, where it is known as a colonizing species.

**Nitrogen fixing:** The tree nodulates; the nodules are moderate, globose to elongate. It therefore improves soil fertility.

**Soil improver:** Heavy litter fall decomposes to enrich the soil with nitrogen, phosphorus and organic carbon.

**Intercropping:** It may be planted as one component of a multitiered homegarden system, where it contributes several products.

**Ornamental:** Widely used in urban and roadside plantings in the Indian subcontinent and in other parts of the world. It is noted as one of the most desirable trees for streets and backyards in Florida and Arizona, USA. It has been used for landscaping along the shores of the Sea of Galilee, Israel.

**Other services:** *Dalbergia sissoo* has an unusual amenity use as a host for orchids. The sub-Himalayas, the homeland of *D. sissoo*, abound with a variety of orchids, many of which are known throughout the world for their beauty.

**TREE MANAGEMENT**

A fast-growing species; growth rates of 3.7 m in 1 year, 5 m in 3 years, 11 m in 5 years and 15 m in 10 years have been recorded. *D. sissoo* plantations are established in block or strip plantations at 1.8 x 1.8 m to 4 x 4 m. Closer spacing is used for straight timber of good quality. When the canopy closes, at about 6 years, 30-40% of the stems are thinned to selectively remove suppressed, diseased and badly formed trees. Thinning is recommended every 10 years where the rotation is 30-60 years. There is evidence that the stumps begin to lose vigour after 2 or 3 rotations when managed as a coppice crop. It coppices vigorously up to about 20 years of age.

**GERMPLASM MANAGEMENT**

Seed storage behaviour is orthodox; viability is maintained for 4 years in hermetic storage and 1-2 years when stored in airtight containers under dry, cool (5-22 deg. C) conditions. There are approximately 45 000-55 000 seeds/kg.

**PESTS AND DISEASES**

Pests reported include *Plecoptera reflexa* (a defoliator), *Dichomeris eridans* (leaf binder), *Brachytrypes portentosus* (causing nursery damage) and termites that attack young trees. Parasitic plants reported to cause considerable damage to sissoo include *Loranthus longiflorus* and *Tapinanthus dodoneifolius*; in alluvial forests, climbers like *Dregea volobilis*, *Cryptolepis buchanani* and *Acacia pennata* cause the same damage. Leaf diseases include the powdery mildew fungus, *Cercospora sissoo* (leaf spot), *Colletotrichum sissoo* (leaf blight fungus), and *Fusarium solani dalbergiae* (leaf wilt). Wood pathogens recorded include *Daedalea flavida* (wood rot fungus) and *Fomes durissimus* (stump rot fungus).

**FURTHER READING**

- Anon. 1986. The useful plants of India. Publications & Information Directorate, CSIR, New Delhi, India.
- Bekele-Tesemma A, Birnie A, Tengnas B. 1993. Useful trees and shrubs for Ethiopia. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA).
- Hocking D. 1993. Trees for Drylands. Oxford & IBH Publishing Co. New Delhi.
- Hong TD, Linington S, Ellis RH. 1996. Seed storage behaviour: a compendium. Handbooks for Genebanks: No. 4. IPGRI.
- ICRAF. 1992. A selection of useful trees and shrubs for Kenya: Notes on their identification, propagation and management for use by farming and pastoral communities. ICRAF.
- Kamaluddin M, Ali M. 1995. Genetic improvement and propagation strategy for *Dalbergia sissoo* in Bangladesh. Bangladesh Journal of Forest Science. 24(2):54-61.
- Kayastha BP. 1985. Silvics of the trees of Nepal. Community Forest Development Project, Kathmandu.
- Keay RW. 1989. Trees of Nigeria. Clarendon Press Oxford.
- Lanzara P. and Pizzetti M. 1978. Simon & Schuster's Guide to Trees. New York: Simon and Schuster
- Little EL. 1983. Common fuelwood crops. Communi-Tech Association, Morgantown, West Virginia.
- MacDicken GK. 1994. Selection and management of nitrogen fixing trees. Winrock International, and Bangkok: FAO.
- Mbuya LP et al. 1994. Useful trees and shrubs for Tanzania: Identification, Propagation and Management for Agricultural and Pastoral Communities. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA).
- Parkash R, Hocking D. 1986. Some favourite trees for fuel and fodder. Society for promotion of wastelands development, New Delhi, India.
- Parrotta JA. 1989. *Dalbergia sissoo* Roxb. SO-ITF-SM-24. Rio Piedras, Institute of Tropical Forestry.
- Parrotta JA. 1989. Sissoo, Indian rosewood. Oxford & IBH Publishing Co, New Delhi, India.
- Roshetko JM, Westley B. 1994. *Dalbergia sissoo* production and use: a field manual. NFTA.
- Shrestha KR, Shrestha KB, Dhakal LP, Kjaer ED, Lilleso JP. 2003. Experiences of *Dalbergia sissoo* improvement in Nepal - lessons learned: 14p.
- Singh RV. 1982. Fodder trees of India. Oxford & IBH Co. New Delhi, India.
- Soerianegara I, Lemmens RHMJ (eds.). 1993. Plant Resources of South-East Asia. No. 5(1): Timber trees: major commercial timbers. Backhuys Publishers, Leiden.
- Taylor DH, Macdicken KG. 1990. Research on multipurpose tree species in Asia. Proceedings of an International Workshop held November 19-23, 1990 in Los Baños, Philippines. Winrock International Institute for Agricultural Development.
- Vimal OP, Tyagi PD. Fuelwood from wastelands. Yatan Publications, New Delhi, India.
- Vogt K. 1995. A field guide to the identification, propagation and uses of common trees and shrubs of dryland Sudan. SOS Sahel International (UK).
- White KJ. 1990. Horticultural varieties and amenity uses of *Dalbergia sissoo* Roxb. in Nepal. Banko Janakari. 2(4):382-384.

**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>)