Albizia procera

(Roxb.) Benth.

Fabaceae - Mimosoideae

white siris, safed siris, forest siris

LOCAL NAMES
Bengali (koroi,modeloa); Burmese (sitpen,kokko-sit,sit); English (forest siris,white siris,albizia,tall albizia,safed siris,acacia,brown albizia); Filipino (akleng parang); Gujarati (karangro); Hindi (karak,kalsis,safed siris,karanji,baro dun-siris,gurar); Indonesian (weru,wangkal,ki hiyang); Javanese (weru); Khmer (tramkang,tronum' kamphe:m); Lao (Sino-Tibetan) (tho:nx,`tho:n); Malay (oriang); Nepali (dun siris,seto siris); Spanish (tall albizia,acacia,abizia); Tamil (konda vagei,selaunjal,velvagai); Thai (suan,thingthon); Trade name (white siris,safed siris,forest siris); Vietnamese (mu[oof]ng xanh)

seeds (Steve Hurst @ USDA-NRCS PLANTS Database)

BOTANIC DESCRIPTION
Albizia procera is a tree with an open canopy, up to 30 m tall and trunk of 35 (60 max.) cm in diameter; bole straight or crooked, up to 9 m. Bark smooth, pale grey-green, yellowish-green, yellowish-brown or brown with horizontal ridges; underbark green, changing to orange just below the surface; inner bark pink or straw coloured; branches terete, glabrous.

Leaves bipinnate with 2-5 pairs of subopposite pinnae; rachis 10-30 cm, glabrous with a gland 1-2.5 cm above the base; gland narrowly elliptical, 4-10 mm long, sessile, flat and disclike or concave with raised margins; pinnae 12-20 cm long, glabrous; leaflets 5-11 pairs per pinna, opposite, rigidly chartaceous to sub-coriaceous, asymmetrically ovate to sub-rhomboid, 2-4.5 (6 max.) x 1-2.2 (3.2 max.) cm; base asymmetrical; apex rounded or subtruncate, often emarginate, mucronate; both surfaces sparsely appressed puberulous, rarely glabrous on top side.

Inflorescence composed of pedunculate glomerules collected in an axillary, sparsely puberulous panicle up to 30 cm long; peduncle (0.8 min.) 1.5-2.3 cm long, 2-5 together; flowers 15-30 per glomerule, sessile, uniform (central flowers usually larger than marginal ones), bisexual.

Fruits rich red or reddish-brown, flattened pods 10-20 x 1.8-2.5 cm, chartaceous, glabrous, with distinct marks over the seeds; mature pods each containing 6-12 seeds, usually remaining on the tree until the whole twig bearing the pods is shed; seeds small, greenish-brown, elliptical to round, flat, with a hard, smooth seed coat, 7.5-8 x 4.5-6.5 x 1.5 mm.

The genus is named after the 18th-century Florentine nobleman and naturalist Filippo del Albizzi. The species name is derived from the Latin word 'procerus', meaning very tall or high, possibly alluding to the height the species can attain.

BIOLOGY
During the dry season the tree becomes almost leafless for a short time. Depending on the location, pods can take 8 months to ripen, as in India, or tree could flower and fruit throughout the year. Seeds may be released from the mature dehiscent pods still attached to the tree or from wind-blown pods that later dehisce or decompose. In Australia, flowering occurs about March to May and the fruits mature from July to October. In Sudan, it flowers from March to April and fruits in May. Flowers are bisexual.

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ECOLOGY

A. procera is widely distributed from India and Myanmar through Southeast Asia to Papua New Guinea and northern Australia. The habitat ranges from monsoon forest, mixed deciduous forest, savannah woodlands, pyrogenic grassland, roadsides and dry gullies, to stunted, seasonal swamp forest. It is commonly found in open secondary forest and in areas with a pronounced dry season. It is susceptible to frost and has moderate light requirements. Once established, it becomes drought tolerant. Best development occurs in areas with more than 2500 mm annual rainfall and mean annual temperature of 21-32 deg. C. If the area is not burned, A. procera will colonize alang-alang (Imperata cylindrica) grassland.

Good survival and rapid early growth have been reported in afforestation trials on both saline and alkaline soils, which are widely cultivated in agroforestry systems.

BIOPHYSICAL LIMITS

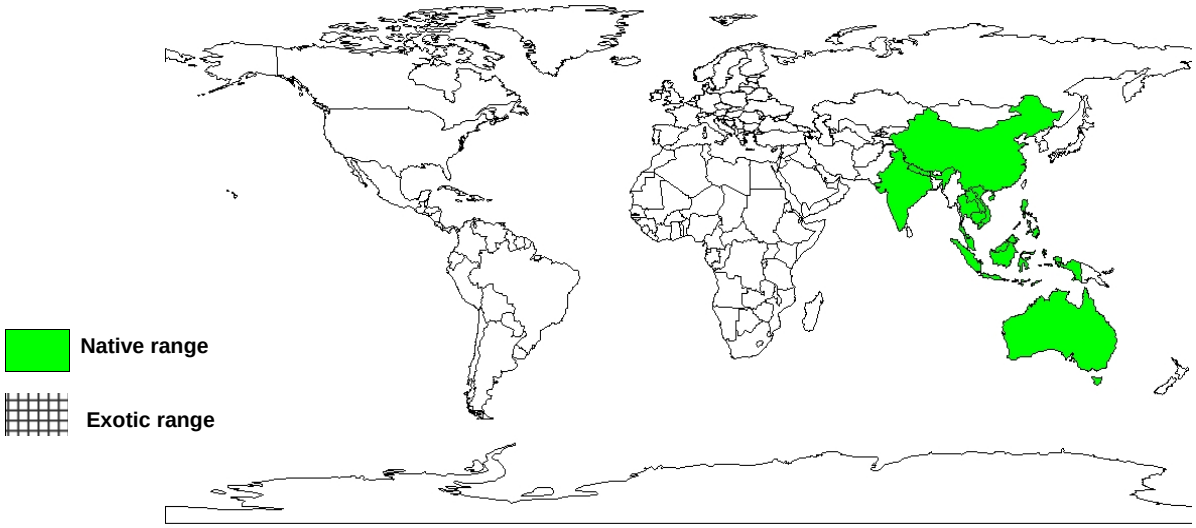
Altitude: 0-1500 m, Mean annual temperature: 1-18º C to 37-46º C, Mean annual rainfall: 100-5000 mm

Soil type: Survives on a variety of soils; grows best on moist alluvial soils, well-drained loams or clay soils with a pH of 5.5-7.5. Tolerates shallow soils and acidity.

DOCUMENTED SPECIES DISTRIBUTION

Native: Australia, Brunei, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Taiwan, Province of China, Thailand, Vietnam

Exotic: Antigua and Barbuda, Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Netherlands Antilles, Panama, Puerto Rico, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines, Sudan, Tanzania, Trinidad and Tobago, Virgin Islands (US), 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
Food: In the Philippines, cooked leaves are eaten as a vegetable. In times of scarcity the bark can be ground with flour and eaten.

Fodder: In South Asia, the Philippines and Australia, the protein-rich fodder of A. procera is eaten by cattle, buffaloes, goats, camels and elephants. Leaves contain 19.9% protein, 3.3% fat, 39.7% carbohydrates, 1.51% calcium, 0.3% phosphorus, 31.9% fibre and 6.2% ash (minerals). Using leaves for fodder is recommended only in mixtures with other species because of their high raw fibre and lignin content, which indicate poor digestibility and inadequate sodium and phosphorus content.

Fuel: The calorific value of dried sapwood is 4870 kcal/kg, and that of heartwood 4865 kcal/kg. Excellent charcoal (39.6%) can be prepared from the wood, and it is widely used as a fuel. Pods and fallen leaves should be considered not as undesirable litter but as potential energy sources. It seems probable that if A. lebbeck fruits can yield 10 barrels of ethanol/ha, this species could as well.

Fibre: The chemical analysis of the wood indicates that it is a suitable material for paper pulp. Bleached pulp in satisfactory yields (50.3%) can be prepared from A. procera wood by the sulphate process. It is suitable for writing and printing paper (mean fibre length is 0.9 mm, mean fibre diameter is 0.021 mm).

Timber: A. procera has a large amount of non-durable, yellowish-white sapwood. The heartwood is hard and heavy, light or dark brown with light and dark bands. Due to the broadly interlocked nature of the grain, it is more suitable for use in large sections where a bolder effect is desired, such as in large-sized panels and tabletops. It seasons and polishes well. The wood is used chiefly for construction, furniture, veneer, cabinet work, flooring, agricultural implements, moulding, carts, carriages, cane crushers, carvings, boats, oars, oil presses and rice pounders. It is resistant to several species of termites, including Bifiditermes beesoni, Cryptotermes cynocephalus and Coptotermes curvignathus, although the last is reported in India as a pest of the tree.

Tannin or dyestuff: The bark can provide tanning material. It is used in India for tanning and dyeing. However, its low tannin content (12-17%), considerable weight loss in drying, and difficult harvesting have limited its importance.

Gum or resin: When injured, the stem exudes large amounts of a reddish-brown gum that is chemically similar to, and used as a substitute for, gum arabic.

Medicine: All parts of the plant are reported to show anti-cancer activity. The roots contain alpha-spinasterol and a saponin that has been reported to possess spermicidal activity at a dilution of 0.008%. A. procera is commonly used in traditional medicines. A decoction of the bark is given for rheumatism and haemorrhage and is considered useful in treating problems of pregnancy and for stomach-ache. The bark is given with salt to water buffalo as a medicine. In India, leaves are poulticed onto ulcers.

Poison: The pounded bark is used as a fish poison, and the leaves are known to have insecticidal and piscicidal properties. The seeds contain proceranin A, which is toxic to mice and rats when administered parenterally and orally; the interperitoneal LD50 for mice is 15 mg/kg body weight. Hydrocyanic acid has been identified as occurring in the tree.

Other products: In the Philippines the wood functions as a cash reserve for farmers, who sell it to local wood carvers.

SERVICES
Erosion control: A. procera is widely planted for its good soil-binding capacity.

Shade or shelter: Occasionally cultivated as shade for tea and coffee plantations. Also acts as a wind and firebreak.

Reclamation: Popular for the rehabilitation of seasonally dry, eroded and degraded soils. Its ability to grow on dry, sandy, stony and shallow soils makes it a useful species for afforestation of difficult sites.

Nitrogen fixing: A. procera fixes atmospheric nitrogen. It readily forms an association with Rhizobium species, enabling it to thrive in nitrogen-deficient soils.

Ornamental: A useful tree for farm and amenity planting. Trees are often planted along avenues and in gardens to beautify them.

Boundary or barrier or support: The branches (twigs) are used by tea planters as stakes for laying out tea gardens. These are found to split well. The species is popular along field borders.

TREE MANAGEMENT
A. procera is a large, fast-growing tree, with a mean annual increment in diameter of 1-4 cm; it attains a dbh of 40-60 cm in 30 years. Spacing of 2-3 x 0.5 m in pure stands results in canopy closure in about 3 years. Trees that are suppressed in dense stands will die from lack of light. Due to the light crown, regular weeding and control of the undergrowth are required. Therefore A. procera is often mixed with other species and planted at a spacing of 3 x 1 m. Mixed planting and pruning in open stands can improve stem form and give a bushy crown. Thinning is necessary after 9 years. Because of its aggressive growth, A. procera is a potential weed. This is particularly true in the Caribbean, where it grows faster than many native species.

A. procera seedlings, saplings and larger trees all coppice vigorously when damaged. The application of phosphorus fertilizer can improve nodulation and nitrogen fixation, particularly on infertile soils.

Natural forests are managed for timber production by coppicing on a 40-year rotation. Fuelwood plantations are managed on a 20-year rotation. Plantations should be weeded twice in the 1st year and once during the 2nd. During weeding soil should not be unduly exposed; only weeds directly interfering with seedlings should be removed.

GERMPLASM MANAGEMENT
Seed storage behaviour is orthodox. Clean seed can be stored at room temperature for 10 months with minimal loss of viability. However, germination can drop to below 50% after storage. Seeds survive 10 years or more at room temperature. Viability is maintained for more than 3 years in hermetic storage at room temperature with 13 + or - 2% mc. There are about 17 000 viable seeds/kg.

PESTS AND DISEASES
In India and Malaysia, A. procera trees have sometimes been defoliated by larvae of Lepidoptera species such as Ascostis selenaria, Rhesala imperata, R. inconcinnalis and R. moestalis. In India, young shoots and saplings are attacked by Oxyrhachis tarandus and O. mangiferana. A caterpillar, Indarbela quadrinotata, eats the bark, and a red borer, Zeuzera coffeae, attacks the woody stems and branches of saplings. In India a beetle, Bruchus bilineatopygus, causes up to 80% damage to seeds by boring into them. The termite Coptotermes curvignathus is reported as a pest of the tree in India, while in Africa the termite Ancistrotermes amphidon is a serious pest on young trees. Another 50 insect pests of Coleoptera, Hemiptera, Homoptera and Lepidoptera feed on young shoots, leaves, roots, sap, seeds, and dead wood in Southeast Asia.

The tree is also susceptible to diseases from stem cankers such as Fusarium solani and Nectria haematococca. Rusts include Sphaerophragmium acaciae and Ravenelia sessilis. Fusarium oxysporum ssp. perniciosum invades the fine roots and causes gummosis of vessels, wilt and eventual death. Root and butt rot is also a problem.

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SUGGESTED CITATION

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