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Albizia gummifera (J.F.Gmel.) C.A.Sm.

Protologue

Bull. Misc. Inform. Kew 1930(5): 218 (1930).

Family

Mimosaceae (Leguminosae - Mimosoideae)

Synonyms

Albizia sassa (Willd.) Chiov. (1912).

Vernacular names

Peacock flower, smooth-bark flat-crown (En). Farroba de Lala, mpepe (Po).

Mkenge, mchapia tumbili, mchani mbao, mshai (Sw).

Origin and geographic distribution

Albizia gummifera is widespread, occurring from eastern Nigeria to western Ethiopia and Kenya, and south to Zimbabwe and Mozambique; also in central Madagascar.

Uses

The wood (trade names: red nongo, mepepe, omulera) is used for light construction, furniture, cabinet work and various implements. It is also suitable for mine props, light flooring, joinery, interior trim, panelling, framing, toys and

novelties, sporting goods, boxes, crates, carvings, peeled and sliced veneer, plywood, hardboard and particle board. Logs are traditionally used for the construction of canoes. The wood is sometimes used as firewood and for making charcoal. The wood pulp is suitable for paper production.

Albizia gummifera is planted as an ornamental shade tree. It is valued as a shade tree for crops, e.g. in coffee plantations in Ethiopia, tea plantations in Malawi and vanilla plantations in Madagascar, and is also planted or retained for soil conservation and improvement. The gum from the bark is sometimes used in confectionery.

Various plant parts are used in traditional medicine. In Kenya a bark infusion is taken to treat malaria, in Uganda to hasten parturition. The pounded bark is used in Kenya as a snuff to treat headache, and in Tanzania it is applied externally to treat scabies. In eastern DR Congo a bark maceration is used as a body wash and drink to treat psoriasis. The roots and leaves are purgative and are used in Madagascar to treat diarrhoea and eye troubles. In Malawi roots are soaked in water for 10 minutes, and the liquid is drunk to relieve the pain caused by sprains. In Madagascar a leaf decoction is reputed to have antitussive activity and is administered to treat asthma; leaves are applied to sores and fractures. In Kenya pounded roots are added to a bath to treat skin diseases, and an extract of crushed pods is drunk to treat stomach-ache. In Uganda roots are used to treat sleeping sickness. The foliage is browsed by goats. The flowers produce nectar for bees, which often build nests in the trunk. The leaves are said to quicken the ripening of bananas.

Production and international trade

The timber of *Albizia gummifera* is mainly used locally and probably not much traded internationally. Production and trade statistics are not available.

Properties

The heartwood is yellowish brown or reddish brown, often with a golden tinge,

and distinctly demarcated from the 7–10 cm wide pale yellow or white sapwood. The grain is straight or interlocked, texture medium to coarse. Quarter-sawn surfaces are often striped.

The wood properties of *Albizia gummifera* are variable and depend on the origin of the wood, that from Madagascar being heaviest and strongest. The wood is moderately light to moderately heavy, with a density of 430–800 kg/m³ at 12% moisture content. It dries slowly, but generally with little degrade. The shrinkage rates from green to oven dry are 2.9–3.5% radial and 8.2–8.7% tangential. Once dry, the wood is fairly stable in service. At 12% moisture content, the modulus of rupture was 75 N/mm², modulus of elasticity 8900 N/mm², compression parallel to grain 40.5 N/mm², shear 12 N/mm², cleavage 82 N/mm and Janka side hardness 2840 N in a test of wood from Uganda.

The wood generally saws and works fairly easily with ordinary hand and machine tools, but sawn and planed surfaces tend to pick up. The use of a filler is necessary to obtain a good finish. The wood holds nails and screws well and does not split easily. The gluing and staining properties are satisfactory, and steam bending properties moderate. The wood dust may cause irritation to nose and throat.

Reports on durability of the heartwood are contradictory, but in general it is susceptible to fungal, wood borer and termite attack. The heartwood is resistant to impregnation by preservatives.

In an experiment in Ethiopia, the leaves and twigs of *Albizia gummifera* contained per 100 g dry matter: N 3.8 g, P 0.2 g, K 1.5 g, lignin 26 g, soluble polyphenols 8.5 g; they had a C/N ratio of 12. Mulching a maize crop with the leaves and twigs resulted in a smaller yield increase than green manure of the other species tested, probably due to the low P and K content of the *Albizia gummifera* green manure.

A dichloromethane extract of *Albizia gummifera* root bark showed considerable in-vitro antitrypanosomal activity, with an IC₅₀ value of 0.07 µg/ml, which confirms its use as a traditional treatment of sleeping sickness. Extracts also showed in-

vitro antimalarial activity against *Plasmodium falciparum*, although much less than chloroquine used as reference drug. The presence of triterpenoid saponins, sapogenin lactones and macrocyclic spermine alkaloids (budmunchiamines) has been reported for the stem bark. These last compounds were active against gram-positive and gram-negative bacteria.

Adulterations and substitutes

The wood of *Albizia zygia* (DC.) J.F. Macbr. is very similar to that of *Albizia gummifera* and is used for the same purposes.

Description

Medium-sized deciduous tree up to 30 m tall; bole straight and cylindrical, up to 75(–100) cm in diameter, without buttresses or with small, thick buttresses; bark yellowish to grey, usually smooth, inner bark with clear gum; crown flattened; young branches finely pubescent, but soon glabrescent. Leaves alternate, bipinnately compound with (3–)5–7(–8) pairs of pinnae; stipules lanceolate, up to 7 mm long, caducous; petiole 2.5–4.5 cm long, near the base of upper side with a sessile gland, rachis 4.5–11 cm long, pubescent; leaflets in 6–17 pairs per pinna, sessile, obliquely rhombic, up to 2 cm × 1 cm, often auricled at proximal side of base, obtuse to acute at apex, glabrous but with some hairs on midrib and margins. Inflorescence an axillary head on a 2.5–5 cm long peduncle. Flowers bisexual, regular, 5-merous, reddish white, almost sessile, subtended by up to 6 mm long, caducous bracteoles; calyx obconical, 2–5 mm long, minutely pubescent outside; corolla 7–12 mm long, with 4.5–6 mm long tube, pubescent outside; stamens numerous, 2.5–3.5 cm long, united into a tube for most of their length, white in lower part and reddish in upper part; ovary superior, ellipsoid, 1.5–2.5 mm long, gradually tapering into a 2.5–3.5 cm long style. Fruit an oblong, flat pod 10–21 cm × 2–4 cm, with stipe c. 1 cm long, glabrous, transversely veined, pale brown to reddish brown when ripe, opening with 2 papery valves, 9–12-seeded. Seeds flattened globose to broadly oblong, 8–12 mm × 7–10 mm.

Other botanical information

Albizia comprises about 120 species and occurs throughout the tropics. Approximately 35 species are found in continental Africa and about 30 in Madagascar. It is characterized by the head-like inflorescence, with 1–2 central flowers modified, functionally male and having a larger, nectar-producing staminal tube. Molecular analyses showed that *Albizia* is heterogeneous, and a revision of the genus is needed. *Albizia gummifera* is related to *Albizia zygia*, and hybrids between the two species have been recorded. *Albizia gummifera* is frequently confused with *Albizia adianthifolia* (Schumach.) W.Wight, which differs in its pubescent leaflets and pods.

Albizia grandibracteata Taub. is another closely related species. Like that of *Albizia gummifera*, its wood is known under the trade name 'red nongo'. It differs from *Albizia gummifera* in having fewer leaflets per pinna (as in *Albizia zygia*) and broad bracts and stipules. Hybrids between *Albizia gummifera* and *Albizia grandibracteata* have been recorded. *Albizia grandibracteata* occurs in eastern DR Congo, Rwanda, Burundi, southern Sudan, south-western Ethiopia, western Kenya, Uganda and northern Tanzania. Its wood is similar to that of *Albizia gummifera* and used for the same purposes. It is also used as firewood and for charcoal production. In DR Congo a leaf infusion, together with other ingredients, is used in a vapour bath to treat fever, in Uganda the pounded leaf is taken mixed with other ingredients to treat diarrhoea, and in Kenya a root infusion is drunk to treat tonsillitis. A methanolic extract of leaves of *Albizia grandibracteata* and saponins isolated from this extract have shown in-vitro antitumour activity against KB and MCF7 cell lines. Like *Albizia gummifera*, *Albizia grandibracteata* is planted as an ornamental and shade tree, and to improve the soil.

Albizia viridis E.Fourn., a tree up to 20 m tall from Madagascar, may be confused with *Albizia gummifera* because of its obliquely rhombic leaflets, but it differs in having stipels at the base of pinnae and stamens united at base in a much shorter tube. In northern and eastern Madagascar the wood of *Albizia viridis* is

used for flooring and furniture. *Albizia mahalao* Capuron is close to *Albizia viridis*, but has oblong to elliptical leaflets (not rhombic). It is a small tree up to 10(–15) m tall, rather frequent on sandy soils in southern Madagascar. Its wood is used for construction. *Albizia mainaea* Villiers is a small tree up to 15 m tall with a bole diameter up to 60 cm, widespread in western and southern Madagascar. It resembles *Albizia gummifera*, but can be distinguished by its grooved leaf rachis, almost completely glabrous leaflets and pubescent pods. Its wood is brown and hard and used for construction and canoes.

Anatomy

Wood-anatomical description (IAWA hardwood codes):

Growth rings: (1: growth ring boundaries distinct); (2: growth ring boundaries indistinct or absent). Vessels: 5: wood diffuse-porous; 13: simple perforation plates; 22: intervessel pits alternate; 23?: shape of alternate pits polygonal; 25: intervessel pits small (4–7 µm); 26: intervessel pits medium (7–10 µm); 29: vestured pits; 30: vessel-ray pits with distinct borders; similar to intervessel pits in size and shape throughout the ray cell; 42: mean tangential diameter of vessel lumina 100–200 µm; 43: mean tangential diameter of vessel lumina ≥ 200 µm; 46: ≤ 5 vessels per square millimetre; (47: 5–20 vessels per square millimetre); 58: gums and other deposits in heartwood vessels. Tracheids and fibres: 61: fibres with simple to minutely bordered pits; 65: septate fibres present; 66: non-septate fibres present; 69: fibres thin- to thick-walled. Axial parenchyma: 76: axial parenchyma diffuse; (79: axial parenchyma vasicentric); 80: axial parenchyma aliform; 81: axial parenchyma lozenge-aliform; (83: axial parenchyma confluent); (90: fusiform parenchyma cells); 91: two cells per parenchyma strand; 92: four (3–4) cells per parenchyma strand. Rays: 98: larger rays commonly 4- to 10-seriate; 104: all ray cells procumbent; (114: ≤ 4 rays per mm); 115: 4–12 rays per mm. Mineral inclusions: 136: prismatic crystals present; 142: prismatic crystals in chambered axial parenchyma cells.

(P. Mugabi, A.A. Oteng-Amoako & P. Baas)

Growth and development

Trees are capable of growing rapidly. The roots develop nitrogen-fixing nodules containing *Bradyrhizobium* bacteria. *Albizia gummifera* trees live in association with arbuscular mycorrhizae.

Ecology

Albizia gummifera occurs in rainforest and riverine forest, sometimes also in savanna vegetation close to forest, usually at higher altitudes, up to 2500 m, but sometimes near sea-level. It is locally common. In Zimbabwe it is reportedly fire resistant and only slightly sensitive to frost.

Propagation and planting

Seeds for planting should be collected from the trees before the pods dehisce, to avoid insect damage. There are 10,000–15,000 seeds per kg. Fresh seeds may have a germination rate of up to 80% in 3–10 days, and do not require pre-treatment. However, in Ethiopia seedcoat-induced dormancy has been recorded, hampering complete, rapid and uniform germination. Scarification improves the germination capacity and vigour of the seeds. Seeds can be stored for more than one year in a sealed container in a cool place, after adding ash to reduce insect damage. Stored seeds should be soaked in water before planting. A fine and firm seedbed is required for even germination and vigorous seedling growth.

Wildlings are sometimes collected for planting.

Management

The addition of NPK fertilizer is recommended for seedlings. In planting experiments in Ethiopia, *Albizia gummifera* showed a survival rate of 94%. Young planted trees can be managed by coppicing and lopping. They are often damaged by strong wind, from which they should be protected.

Handling after harvest

Freshly harvested logs float in water and can be transported by river. Treatment of the logs with preservatives is necessary if they are to be left in the forest for some time, to avoid damage by fungi or insects.

Genetic resources

Albizia gummifera is widespread and locally common, also in secondary forest. It is therefore not easily liable to genetic erosion.

Prospects

Albizia gummifera is a multipurpose species. It seems to have good prospects as a commercial timber tree in sustainably managed forests and in afforestation projects. Further tests are needed to confirm its promise as an auxiliary tree in agroforestry systems. Once adequate vegetative propagation techniques have been developed, *Albizia gummifera* deserves to be promoted for planting.

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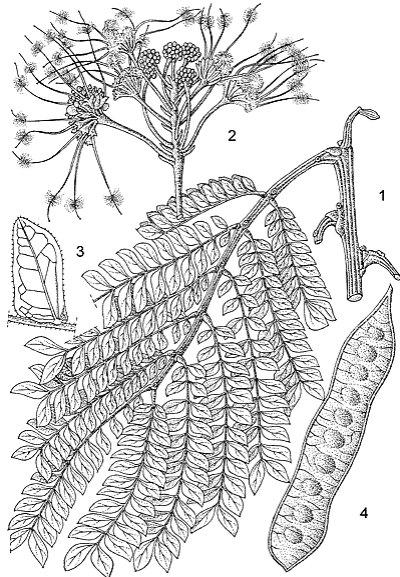
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wild



1, leafy twig; 2, flowering twig; 3, leaflet; 4, fruit.

Redrawn and adapted by Achmad Satiri Nurhaman



tree habit



bole



slash



flowering tree



flowering branch

obtained from [Zimbabweflora](#)



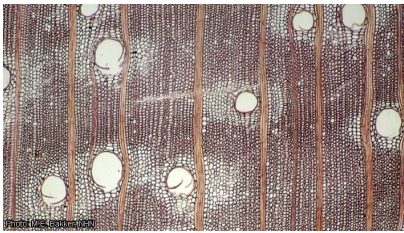
inflorescence

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Photo: G. Rakotovo

wood



wood in transverse section



wood in tangential section



wood in radial section
