

Dendrocalamus asper (PROTA)

From PlantUse



Plant Resources of Tropical Africa
Introduction

List of species

Dendrocalamus asper (Schult. & Schult.f.)
Backer ex K.Heyne

General importance	★★★★☆
Geographic coverage Africa	★★★★☆
Geographic coverage World	★★★★☆
Vegetable	★☆☆☆☆
Timber	★★★★☆
Food security	★☆☆☆☆

Protologue: Nutt. pl. Ned.-Ind., ed. 2, 1: 301 (1927).

Family: Poaceae (Gramineae)

Chromosome number:

Synonyms

Gigantochloa aspera (Schult. & Schult.f.) Kurz (1876).

Vernacular names

Giant bamboo, rough giant bamboo, sweet bamboo (En). Bambou géant (Fr).

Origin and geographic distribution

The origin of *Dendrocalamus asper* is not certain, but is thought to be in South-East Asia.

Dendrocalamus asper is planted throughout tropical Asia and has been introduced in other tropical countries, including Ghana, Benin, DR Congo, Kenya and Madagascar.

Uses

In Benin the stems are used for construction and as support for TV antennas. In Asia the mature stems are used for construction, furniture, boards, musical instruments, household utensils, crafts, outriggers of fishing boats and for paper making, the upper internodes are used as containers and cooking pots. The young and tender shoots are consumed as a vegetable.

Properties

The stems have thick walls and are very strong and durable. At a moisture content of 8% the density of the stem walls is 0.7–0.8 g/cm³. At 15% moisture content, the modulus of rupture is 103 N/mm², compression parallel to grain 31 N/mm² and shear 7 N/mm².

The average dimensions of the stem fibres are: length 3.8 mm, diameter 19 µm, lumen width 7 µm, wall thickness 6 µm. The chemical composition of the stem is approximately: holocellulose 53%, pentosans 19%, lignin 25% and ash 3%. The solubility in cold water is 4.5%, in hot water 6%, in alcohol-benzene 1%, in 1% NaOH 22%. Fibre cells from stem material from DR Congo had an average length of 2.5 mm, with a diameter of 17 µm and a cell wall thickness of 7 µm; they were very rigid. The material from DR Congo contained: holocellulose 58–62%, α-cellulose 44–49%, pentosans 16–21%, lignin 23–28% and ash 1–3%. The solubility in hot water was 3–7%, in alcohol-benzene 1–3%, in 1% NaOH 16–30% and in ether 0.2–0.6%. The fibres were considered suitable for secondary quality packing paper.

The edible portion of young shoots is about 34%, weighing on average 5.4 kg before peeling and 1.8 kg after peeling. The shoots of *Dendrocalamus asper* are considered the best of all tropical Asiatic bamboos. Their canning quality is good.

Description

Bamboo with a short, thick rhizome and densely tufted stems; stem (culm) erect with pendulous tip, 15–30 m tall, 8–20 cm in diameter, hollow but sometimes almost solid at base, wall 11–36 mm thick, when young covered with fine, velvety, golden-brown, appressed hairs, later glabrous; lowest internodes 10–20 cm long, upper ones 30–50 cm or more, white waxy below the nodes; nodes swollen, lowest nodes bearing aerial roots. Leaves alternate, simple; stem leaves with sheath up to 50 cm × 25 cm, brown hairy, with prominent auricles, ligule up to 10 mm long and blade up to 50 cm × 7 cm; branch leaves with sheath glabrous or with scattered appressed pale hairs, auricles absent, ligule 2 mm long, blade 15–30(–45) cm × 1–2.5(–8.5) cm, shortly stalked at base, glabrous above, hairy but glabrescent below. Inflorescence a panicle on a leafless branch, with clusters of spikelets at the nodes. Spikelets ellipsoid, 6–9 mm × 4–5 mm, slightly laterally flattened, comprising 1–2 glumes and 4–5 florets, often with a sterile apical floret; lemma ovate, c. 8 mm long, short-hairy, palea papery, 2-keeled, but the uppermost without keels, 4–7-veined; florets with 6 stamens and ovoid ovary, stigma 1. Fruit not developing.

Other botanical information

The shoots of *Dendrocalamus asper* normally grow to their full height in less than a year, but after brief rainy seasons the growth ceases and continues when the next rain starts. The lateral branches develop when the stem reaches its full height. A stem matures in 3–4 years. A good healthy clump can produce several shoots annually. The stems produced in later years are larger than those produced earlier. Stems reach maximum diameters 5–6 years after planting. A mature clump may attain a diameter of 3 m or more and contains about 60 stems. Flowering occurs in plants that are 100–120 years old. After flowering, the plant dies.

Dendrocalamus comprises about 35 species, distributed from India to China and the Philippines.

Ecology

In tropical Asia *Dendrocalamus asper* is planted or naturalized up to 1500 m altitude. It thrives best, however, at 400–500 m altitude, in areas with average annual rainfall of about 2400 mm.

Dendrocalamus asper will grow in any type of soil, but it prefers heavy soils with good drainage.

Management

Dendrocalamus asper can be propagated by rhizome, stem and branch cuttings. A protocol has been developed for rapid micropropagation using nodal segments with axillary buds on Murashige and Skoog medium. In Asia the propagules are raised in the nursery and after they have produced roots they are planted out in the field before or during the first half of the rainy season. They are planted in holes containing a mixture of manure and chemical fertilizer, at distances 5–10 m × 5–10 m. Young plants require regular watering and weeding during the growing period because they cannot compete for nutrients, light and moisture. Young shoots are usually harvested during the rainy season. Stems are preferably harvested in the dry season. It is recommended to harvest mature stems 5–7 years old, and always to leave some mature stems in the clump.

The powder-post beetles *Dinoderus minutus* and *Dinoderus brevis* cause considerable damage to harvested stems. In Asia harvested stems are traditionally soaked in water or mud to decrease starch and sugar contents. For better preservation, several treatments with chemical solutions are possible. In Indonesia a modified Boucherie treatment, involving replacement of sap with chemicals based on borax and boron under pressure, is most successful.

Genetic resources

Dendrocalamus asper is available in many botanical gardens in the tropics. Due to its vegetative reproduction, the genetic diversity of the species is low.

Prospects

Dendrocalamus asper grows rapidly and produces long stems. It may have potential in tropical Africa as an alternative for wood, e.g. as a source of construction material and for paper making and fuel. For use as construction material, effective protection against attack by powder-post beetles is necessary. Aspects requiring further investigation include propagation and crop management.

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Author(s)

- M. Brink

PROTA Network Office Europe, Wageningen University, P.O. Box 341, 6700 AH Wageningen, Netherlands

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- See the Prota4U ([http://www.prota4u.org/protav8.asp?en=1&p=Dendrocalamus+asper+\(Schult.+&+Schult.f.\)+Backer+ex+K.Heyne](http://www.prota4u.org/protav8.asp?en=1&p=Dendrocalamus+asper+(Schult.+&+Schult.f.)+Backer+ex+K.Heyne)) database.

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