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Generationengerechtes Wirtschaften



DOSSIER

Jabon

**Lat. Anthocephalus Cadamba/ Anthocephalus chinensis/
Anthocephalus macrophyllus**

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1. Biological Characteristics and Technical Characteristics

Natural Occurrence: in the sub Himalayan tract from Nepal eastwards, extending through West Bengal and Assam into Burma, Nepal and Sri Lanka, Malaysia across Indonesia and Borneo to the Philippines and New Guinea.

Evergreen or semi-evergreen tree, reaches height of ca 9m with girth of 1,5 to 2m. "The tree has generally a thin plank buttresses at the base. Bark is thick but smooth in young trees, becoming darker, exfoliating in longitudinal fissures in older trees. Foliage consists of 13 to 30 cm by 5 to 15 cm, elliptic- oblong, shining, opposite, simple leaves. Flowers are small, orange-coloured in dense terminal globose heads, 2.5-5 cm in diameter. The fruit, a pseudocarp is a globose, orange fleshy mass of closely packed capsules each containing a number of minute, angular seeds."¹

"Anthocephalus cadamba is a large tree with a broad crown and straight cylindrical bole. The tree: may reach a height of 45 m with trunk diameters of 100-(160) cm. The tree sometimes has small buttresses and a broad crown. The bark is gray, smooth in young trees, rough and longitudinally fissured in old trees. Leaves glossy green, opposite, simple more or less sessile to petiolate, ovate to elliptical (15-50 x 8-25 cm). Inflorescence in clusters; terminal globose heads without bracteoles, subsessile fragrant, orange or yellow flowers; Flowers bisexual, 5-merous, calyx tube funnel-shaped, corolla gamopetalous saucer-shaped with a narrow tube, the narrow lobes imbricate in bud. Stamens 5, inserted on the corolla tube, filaments short, anthers basifixed. Ovary inferior, bi-locular, sometimes 4-locular in the upper part, style exserted and a spindle-shaped stigma. Fruitlets numerous with their upper parts containing 4 hollow or solid structures. Seed trigonal or irregularly shaped. A. cadamba is closely allied to the subtribe Naucleinae (Rubiaceae) but differs from them in its placentation mode. The species is in the focus of a classification controversy based on the name of the original type specimen described by Lamarck."²

Does not require pruning because the branches will fall off during the growth period by itself (the tree is self pruning).³



Anthocephalus cadamba fruits show significant antifungal activity against the organisms: Trichophyton rubrum, Candida albicans, Microsporum, Aspergillus niger.⁴ Anthocephalus Cadamba has a trunked cylinder with a very good level of alignment.⁵

¹ Cultivation and Management of Anthocephalus Cadamba – NAIP – A Value Chain on Industrial Agroforestry in Tamil Nadu Project by Tamil Nadu University
http://www.fcrinaip.org/anthocephaluscadamba_cultivation.php 11/11/13

² AgroForestryTree Database: Anthocephalus cadamba
<http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=17933>
08/11/2013

³ <http://ashirajabonmandiri3.indonetwork.net/2065514/kayu-jabon-anthocephalus-cadamba.htm> 08/11/2013

⁴ Ram Prakash Mishra, Liza Siddique: Antifungal properties of Anthocephalus cadamba fruits. Asian Journal of Plant Science and Research, Vol. 1,2 (2011), p. 81-87.
<http://www.pelagiaresearchlibrary.com/asian-journal-of-plant-science/vol1-iss2/AJPSR-2011-1-2-81-87.pdf>

“The wood is white to creamy white, odourless, light in weight (545 kg/cum at 12% moisture content), straight-grained and medium and even textured. It is moderately strong, can be seasoned easily; but susceptible to sap-stain quickly after conversion, non-durable; can be easily and completely treated with preservatives. Treated timber is quite durable. It saws and works easily under tools. Peels readily on a rotary lathe.”⁶



2. Pests and Diseases

“The insect, *Arthroschista hilalaris* attacks kadam. The fungus *Scytalidium lignicola* is found on living branches of *A. cadamba*. Outbreaks of 'Sudden Death', a disease of unknown aetiology, has been severe in Costa Rica to justify the abandonment of the planting. The symptoms are typical of a root infection, as the disease occurs in patches and affected trees show cambial and sapwood staining spreading upwards from the roots. Death of feeding roots is another early symptom. The nematodes *Meloidogyne javanica*, *Hemicriconemoides*, *Tylenchorhynchus* and *Hoplolaimus* are found in association with the roots of *A. cadamba*. The larvae of 5 common species of Scarabaeidae, *Euchlora viridis*, *Holotrichia constricta*, *H. helleri*, *Lepidiota stigma* and *Leucopholis rorida* are polyphagous root pests of kadam.”⁷

Anthocephalus cadamba is so far not attacked by disease as rust tumors⁸

Among the insects, *Aristobia approximator* feeds on the bark, *Dihammus cervinus* bores in the stem and *Dirades adjutaria* defoliates extensive areas.⁹

3. Suitable Environment

Altitude: The suitable altitude for *Anthocephalus Cadamba* is between sea level and 1.000 m above.

Temperatures: Minimum temperatures in the natural habitat vary between 3 and 15,5 °C, maximum temperatures between 32-42 °C. The species is frost sensitive.

⁵ <http://ashirajabonmandiri3.indonetwork.net/2065514/kayu-jabon-anthocephalus-cadamba.htm> 08/11/2013

⁶ Cultivation and Management of *Anthocephalus Cadamba* – NAIP – A Value Chain on Industrial Agroforestry in Tamil Nadu Project by Tamil Nadu University
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⁸ <http://ashirajabonmandiri3.indonetwork.net/2065514/kayu-jabon-anthocephalus-cadamba.htm> 08/11/2013

⁹ Cultivation and Management of *Anthocephalus Cadamba* – NAIP – A Value Chain on Industrial Agroforestry in Tamil Nadu Project by Tamil Nadu University
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Rainfall: Mainly growing in rainforest environments, *Anthocephalus Cadamba* receives between 1.500 and 5.000 mm annual rainfall in its natural habitats. It can, however, also survive with as little as 200 mm annually.¹⁰

“The tree is a light demander, although the young plants need protection against sun. The saplings, however, grown under shade become spindly in their efforts to reach the light. Once they overcome other associates and reach the light, they begin to spread out and the height growth is largely substituted by lateral spread. The seedlings are sensitive to drought and also liable to damp off with an excess of moisture in the soil. The seedlings are also very sensitive to frost, which however, is unknown in its natural habitat. Young plants are very susceptible to browsing by cattle and deer. The tree coppices vigorously. After sapling stage, the tree is quite tolerant of water-logged areas where the water inundates for 2-3 months.”¹¹

Soil: Feasible soil types for *Anthocephalus Cadamba* are clay, brown podzolic clay or rocky soils.¹² “Kadam prefers deep, moist but well-drained loamy soils of alluvial origin. Although it can tolerate a certain amount of oxygen deficiency, on stiff clayey soils, the growth is very poor. It is found growing on freshly exposed soils due to landslides etc., exposed slope and degraded soils exhibiting character of long-lived pioneer species. It also comes up in the sandy soils of Brahmaputra valley. The species is considered suitable for soil conservation, agroforestry, jhum land reclamation etc.”¹³

4. Carbon Storage Capacity

Chauhan et al. present a mean carbon storage per hectare of pure *Anthocephalus Cadamba* stand of 8,2 tones carbon. Their calculations are based on a stand of 3x2 m distance between the trees and the measurements were taken three years after planting. The calculation was based on the extrapolation of carbon storage of three sample trees, so the totals might be imprecise, as the values seem to be too low.¹⁴

5. Effect on Soil

“Reclamation: *A. kadamba* is suitable for reforestation programmes. Soil improver: Sheds large amounts of leaf and non-leaf litter which on decomposition improve some physical and chemical properties of soil under its canopy. This reflects in increases in the level of soil organic carbon, cation exchange capacity, available plant nutrients and exchangeable bases.”¹⁵

¹⁰ Krisnawati, H., Kallio, M. and Kanninen, M.: *Anthocephalus cadamba* Miq.: ecology, silviculture and productivity. CIFOR, Bogor, Indonesia 2011.

¹¹ <http://ashirajabonmandiri3.indonetwork.net/2065514/kayu-jabon-anthocephalus-cadamba.htm> 08/11/2013

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¹⁴ Chauhan, S. et al.: Biomass and Carbon Allocation in different Parts of Agroforestry Tree Species. In: The Indian Forester No 135, 7, 2009.

<http://environmentportal.in/files/Biomass%20and%20carbon%20allocation.pdf> 08/01/14

¹⁵ AgroForestryTree Database: *Anthocephalus cadamba*

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6. Potential Combinations with other Trees and Crops

Anthocephalus Cadamba develops a closed canopy after the first 2-3 years, therefore intercropping is in general impossible, as the intercropped plants would not get enough sunshine. In a study from South Kalimantan, Anthocephalus Cadamba has been planted with fruit trees and rubber (Hevea Brasiliensis).¹⁶

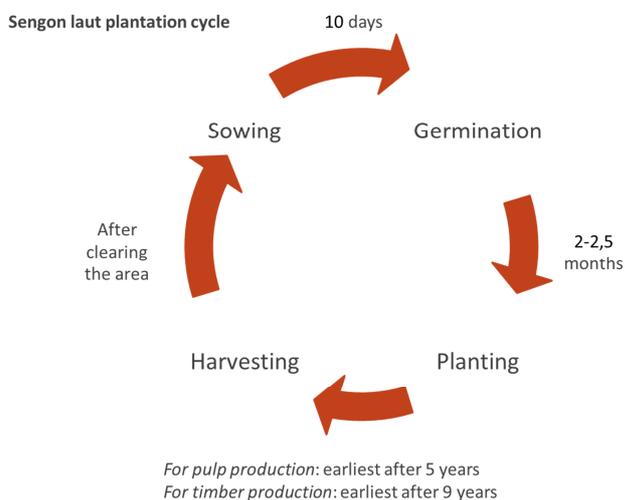
7. Plantation Management

“Propagation methods: Kadam can be raised by planting out nursery raised seedlings. Planting of bare root nursery stock also gives good results. Direct sowing is not very successful because of the small-sized seeds and the their sensitivity to drought, excessive moisture and direct sun. The optimum IBA concentration for rooting and survival in air layering experiments of A. cadamba was 5000 p.p.m.

Tree Management: The tree is a light demander, however the saplings require protection from the hot sun. It is sensitive to frost, drought, excessive moisture and grazing. The young seedlings are highly susceptible to weeds and should be weeded regularly. 2-month seedlings can be transplanted in nursery beds or into polythene bags, where they can be retained before planting at the start of the monsoon rains. To ensure successful establishment, seedlings should be planted out with their balls of earth. The tree coppices well. The growth of kadam is usually fast for the first 6-8 years. At the age of 10-15 years the trees can be felled.

Germplasm Management: The epigeous germination begins in about 10-14 days in the rainy season. Successful extraction of seed from ripe fruits involves air drying, crushing, and sieving through a No. 35 US Standard sieve to separate seed from chaff. Fruits are soaked in the open until rotted, ground by hand into a thick slurry, air dried, and passed through a series of sieves terminating with a No. 35. This procedure improves seed purity up to 98%, and germination success. There are about 900 000-2 700 000 seeds/kg.”¹⁷

Growth Cycle:



Graphic by FVW, contents based on Krisnawati, H., Kallio, M. and Kanninen, M.: Anthocephalus cadamba Miq.: ecology, silviculture and productivity. CIFOR, Bogor, Indonesia 2011.

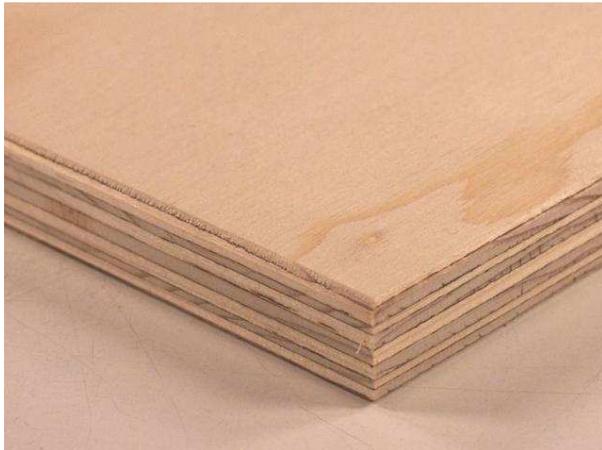
¹⁶ Kallio, Maarit et al.: Mahogany and Kadam Planting Farmers in South Kalimantan: The Link Between Silvicultural Activity and Stand Quality. In: Small-scale Forestry Vol 10 (2011).

¹⁷ AgroForestryTree Database: Anthocephalus cadamba
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Growth rates: Krisnawati et al report an annual MAI per hectare between 15 and 20 m³. These numbers refer to spacious planting patterns of more 4x4m or 5x5m.¹⁸ Kallio et al. provide stand volumes of 36,04 m³ / ha for trees aged 4-5 years, although they maximum values are as high as 110,77 m³ / ha.¹⁹ This equals an annual MAI per hectare of between 7 and 22 m³.

8. Usage

Anthocephalus Cadamba is mainly used for the production of plywood, block board and furniture.²⁰



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18 Krisnawati, H., Kallio, M. and Kanninen, M.: Anthocephalus cadamba Miq.: ecology, silviculture and productivity. CIFOR, Bogor, Indonesia 2011.

http://www.cifor.org/publications/pdf_files/Books/BKrisnawati1105.pdf 08/01/31

¹⁹ Kallio, Maarit et al.: Mahogany and Kadam Planting Farmers in South Kalimantan: The Link Between Silvicultural Activity and Stand Quality. In: Small-scale Forestry Vol 10 (2011).

²⁰ Kallio, Maarit et al.: Mahogany and Kadam Planting Farmers in South Kalimantan: The Link Between Silvicultural Activity and Stand Quality. In: Small-scale Forestry Vol 10 (2011). p. 115–132.

²¹ <http://kayukuina.blogspot.com/2012/03/budidaya-kayu-cepat-panen-kayu-jabon.html>

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