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A HANDBOOK OF LESSER KNOWN TIMBERS

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INTRODUCTION

In 1981, Kerala Forest Research Institute (KFRI) had brought out a *Handbook of Kerala Timbers*, for the benefit of various sectors involved in timber production, processing and marketing which provides information for 162 common timbers. Apart from the non-forest plantations (rubber wood, coconut, etc.) and forest plantations of eucalypts, teak, acacia and pines, it is recognised that the futuristic timber supply is from the trees outside forests (ToF) especially farm lands, estates/converted forests, small woodlots, etc. as well as from the import which include many commercially unfamiliar species in Kerala, India. India being one among the major log importers in Asia, the dependence on import is likely to increase for all industrial wood products by 2010, at least 16% of industrial roundwood, 18% of sawn wood, 28% of wood-based panels, 9.2% of paper and paper-board and 11.6% of fibre furnish in the country (FAO 1998). In Kerala, the State forests including plantations account for only 9% of industrial round wood supply, in contrast to 76% by households and estates while the rest being from imports (Krishnankutty 1990, 1998, 2005). Therefore, many lesser known timbers increasingly become significant in the market supply, causing difficulties in assessing the quality and price fixation.

This handbook will serve as a source of ready reference in the trade and user-sectors to get acquainted with the lesser known timbers of domestic market particularly in Kerala. Properties and uses of 77 timbers are provided in the handbook of which 52 timbers are imported species. The information presented on various properties of timbers and their standard trade and botanical names will facilitate selection of right timber for various applications. This will also be of use to organisations like State Forest Departments, Central Public Works Department, and various public-sector units/ Corporations, who commonly handle timbers.

This user-friendly handbook with illustrations of wood figure (colour, grain and texture) and appearance will point to right choice of timbers especially to substitute the well known commercial timbers which are increasingly becoming scarce in the market. The market price of timber in Indian Rupees (as on year 2006) wherever available, and the substitutes for some of the well-known timbers are also highlighted for the benefit of end-users.

The handbook was prepared by collating published technical information and newly investigated properties of 77 timbers obtained from wood farm/agroforestry sectors and imported sources of Kerala, including those supplied from other states in India. Besides the hardcopy, computer CD-ROM is also provided for the benefit of those who seek real images of surface appearance of different wood species along with technical properties. Content of the CD can be browsed using Adobe Acrobat Reader and can be navigated through the index.

Timber Classification/Explanatory Note

Name and Timber Identity

For each timber, before description of properties, standard trade name and vernacular names are given in accordance with Indian Standard or as mentioned in the international sources of publications for imported timbers. This is followed by botanical name and family

of the timber before indicating the distribution/origin of supply. Timber species are organised in the text as per the standard trade name in alphabetical order.

Timber Description

Each timber is described in the following manner:

Colour: Generally referred to heartwood only unless noted otherwise as heartwood and sapwood.

Weight (Specific gravity): Depending on weight, in air-dry condition, timber is classified as:

a. Very light and light (Specific gravity up to 0.55)
b. Moderately heavy (Specific gravity 0.55-0.75)
c. Heavy and very heavy (Specific gravity above 0.75)

Texture:

a. Fine (Smooth to feel)
b. Medium (Fairly smooth to feel)
c. Coarse (Rough to feel)

Strength group:

a. Weak (Compression parallel to grain up to 28 N/mm^2*)
b. Moderately strong (Compression parallel to grain: 28-41 N/mm^2)
c. Strong and very strong (Compression parallel to grain: above 41 N/mm^2)

Durability: Life span in years (as determined by graveyard tests)

a. Perishable (Less than 5 years)
b. Moderately durable (5-10 years)
c. Durable (10-25 years)
d. Very durable (above 25 years)

Treatability: Ability of the timber to preservative treatment

a. Easy (Timbers that can be penetrated with preservatives completely under pressure without difficulty)
b. Moderately resistant (Timbers that are fairly easy to treat)
c. Resistant (Timbers that are difficult to impregnate under pressure)
d. Extremely resistant (Timbers that are refractory to treatment)

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Krishnankutty, C. N. 1998. Timber price trends in Kerala. *KFRI Research Report 160*. Kerala Forest Research Institute, Peechi, India.

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*1N/mm^2 (1 newton per square millimeter) = 1 MPa (1 mega pascal) = 10.2 Kg/cm^2 (10.2 kilogram per square centimeter)

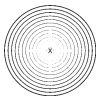
Standard Trade Name

ACACIA / EAR-POD WATTLE

Flat sawn

Quarter sawn

Cross cut



Vernacular names	Akasia (Indonesia), Australian babul, Australian wattle, Acacia, Kasia (India), Darwin black wattle, Tan wattle (Australia)
Botanical name	*Acacia auriculiformis* A. Cunn.ex Benth.
Family name	Fabaceae
Origin (Distribution)	Native to Papua New Guinea, Australia and Solomon Islands; introduced to many tropical countries as a fast growing plantation species for pulpwood.

THE WOOD

Colour	Heartwood light brown to dark red; clearly demarcated from the yellowish white sapwood.
Weight	Moderately heavy (Air-dry specific gravity 0.60-0.75 with average value of 0.72)

Grain Straight or wavy

Texture Fine

Strength Strong

Moisture Content	Static Bending		Compression parallel to grain
	Modulus of Rupture (MOR) N/mm^2	Modulus of Elasticity (MOE) N/mm^2	Maximum Crushing Stress (MCS) N/mm^2
Air-dry (12%)	74	10531	45.0

Drying and shrinkage Dries easily; Shrinkage- radial (2.0%), tangential (4.0%), volumetric (6.0%)

Durability Moderately durable

Treatability Moderately resistant

Working properties Planing- easy; Boring- easy; Turning- easy; Nailing- satisfactory; Finish- good

Typical uses Mainly used for pulpwood production. Suitable for door and window shutters, light construction, furniture, flooring, industrial and domestic woodware, tool handles, turnery articles, carom coins, agricultural implements, charcoal etc.

Price (Rs. per m^3) Log: 6000-11000

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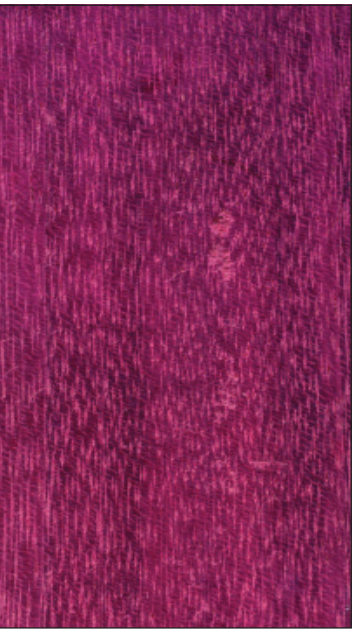
Wood News. 2005. Acacia (*Acacia auriculiformis*). Vol. 15 (1): 22-24.

Standard Trade Name

PURPLEHEART / VIOLET WOOD

Flat sawn



Quarter sawn

Cross cut

Vernacular names	Violet wood (English trade), Guarabu, Purpleheart (Brazil), Morado (Panama, Venezuela), Palo morado (Mexico), Amaranth (USA)
Botanical name	*Peltogyne* spp.
Family name	Fabaceae
Origin (Distribution)	Central America and tropical South America from Mexico to southern Brazil.

THE WOOD

Colour	Heartwood colour varies, deep purple-violet when freshly cut, changes to well-known purple, which on prolonged exposure turns to purple-brown, lustrous; clearly demarcated from the whitish or cream coloured sapwood.
Weight	Heavy (Air-dry specific gravity 0.80-1.0 with average value of 0.86)

Grain Straight, sometimes wavy or interlocked

Texture Medium to fine

Strength Very strong

Moisture Content	Static Bending		Compression parallel to grain
	Modulus of Rupture (MOR) N/mm^2	Modulus of Elasticity (MOE) N/mm^2	Maximum Crushing Stress (MCS) N/mm^2
Air-dry (12%)	147	16700	78.5

Drying and shrinkage Dries fairly rapidly, but with thick material moisture removal is difficult from the centre of the planks; Shrinkage- radial (4.4%), tangential (6.5%), volumetric (10.9%)

Durability Very durable, resistant to dry-wood termites.

Treatability Extremely resistant

Working properties Planing- slightly difficult; Boring- difficult with a tendency to burn; Turning- easy; Nailing- satisfactory with care; Finish- good

Typical uses With high strength and very good durability, an excellent structural timber suitable for heavy outdoor constructional work such as bridges and harbour works, furniture, door and window frames, general carpentry. Suitable for chemical plant as filter-press plates and frames. Used for small turned articles and to a limited scale for decorative veneer inlays. Unsuitable for plywood because of its weight.

Price (Rs. per m^3) Log: 23000

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Rendle, B. J. (ed.). 1969. World Timbers. Vol. 2, North and South America. Ernest Benn Limited. London. 150p.

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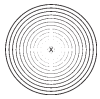
Standard Trade Name

TEAK

Flat sawn

Quarter sawn

Cross cut



Vernacular names	Jati (Indonesia), Java teak (Germany), Kyun (Myanmar), Teca (Brazil), Tek (Indonesia)
Botanical name	*Tectona grandis* L.f.
Family name	Verbenaceae
Origin (Distribution)	Native to India, Myanmar, Laos, Thailand and Indonesia. Extensively raised in plantations within and outside its natural range as well as in tropical areas of Central and South America, East and West Africa and the Carribean.
THE WOOD	
Colour	Heartwood golden brown or dark brown occasionally with black streaks with a waxy feel, lustrous, sometimes with white glistening deposit, distinct aromatic odour with the smell of leather; sapwood pale yellow or grey, well defined.
Weight	Moderately heavy (Air-dry specific gravity 0.55-0.70 with average value of 0.65)
Grain	Straight, sometimes wavy

Texture Coarse

Strength Strong

Moisture Content	Static Bending		Compression parallel to grain
	Modulus of Rupture (MOR) N/mm^2	Modulus of Elasticity (MOE) N/mm^2	Maximum Crushing Stress (MCS) N/mm^2
Air-dry (12%)	106	10000	60.4

Drying and shrinkage Dries well but rather slowly with little or no degrade; Shrinkage- radial (2.3%), tangential (4.8%), volumetric (7.1%). High resistance to water absorption.

Durability Very durable; highly resistant to termite damage.

Treatability Extremely resistant

Working properties Easily worked with both hand and machine tools. Planing- easy; Boring- easy; Turning- rather easy; Nailing- good but pre-boring necessary; Finish-good

Typical uses Used extensively for ship and boat building, Class 1general purpose plywood, cabinet making, interior and exterior joinery, flooring and fine furniture, carving, panelling, turnery, sliced for decorative and face veneers. Teak laboratory fittings and laboratory accessories are a logical choice due to the acid resistant (antioxidant) properties of this timber.

Price (Rs. per m^3) Plantation teak: Log: 42000-60000; Home garden teak- Log: 26000-39000; Burma teak- Log: 44000-51000; Columbian teak- Log: 21000-25000; Ghana teak- Log: 21000-28000; Costa Rican teak (class II/III pole size): 16000-26000; Teak, Ivory Coast: Log: 33000; Converted: 37000.

Special remarks/ diagnostic features of different types of teak wood:

Adilabad teak

- Grows in Rajulmaddugu locality of Andhra Pradesh, India.
- Rose coloured heartwood, attractive surface, fetches high price.

Central province teak (CPT)

- Slow grown wood with close grain from drier areas of central India.
- Deeper colour with twisted or wavy grain gives better appearance and fetches higher price.

Dandeli (North Kanara) teak

- Slow grown, close grained
- Darker in colour

Godavari teak

- Grows in Godavari region of Andhra Pradesh, India.
- Wood is ornamental because of unique appearance.

Home garden/farm grown teak

- Home garden teak has more defects like bends and knots lowering timber value.
- Wood from dry sites has darker golden brown colour with black streaks, making it more attractive in appearance.
- Wood from wet sites has paler colour affecting adversely the price of the timber.
- Wood from homesteads of wet sites is more susceptible to brown-rot fungi although no significant differences exists with respect to white-rot fungi among the home garden and plantation grown timbers.
- High natural durability of teak wood from drier locality is reflected in higher extractive contents with darker colour and is comparable to forest plantation teak.

Konni teak (Kerala)

- Slow grown wood with close grain and darker colour.
- Stronger than Nilambur teak.

Myanmar (Burma) teak

- Slow grown wood mostly from natural growth.
- Close and straight grain with uniform golden brown colour without markings.
- Fetches high price in international trade due to the availability of larger defect-free logs.

Nilambur (Malabar) teak

- Grows fast, yields large diameter logs.
- Straight grain with golden yellowish brown colour, often with darker chocolate-brown steaks.
- Reputed in the trade for ship building and furniture/cabinets.

West African teak

- Wood with black streaks and wavy or twisted grain.
- Wood figure is mostly inferior to that of Asian teak.
- Ghana teak is close and straight grained with uniform golden brown colour.

South and Central American teak

- Generally fast- grown and short rotation plantation teak with high amount of juvenile wood.
- Wood lighter in colour. High amount of sapwood.
  Fetches lower price due to small dimensional log and less heartwood.

Ghana Teak

Quarter sawn

Teak - Ivory Coast

Quarter sawn

Teak - Togo

Flat sawn

Benin Teak

Quarter sawn

Burma Teak

Quarter sawn

Malaysian Teak

Flat sawn

Columbian Teak

Flat sawn

Teak - Costa Rica

Flat sawn

Teak - Ecuador

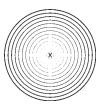
Flat sawn

Home garden Teak - Dry site

Quarter sawn

Thailand Teak

Cross cut



Home garden Teak - Wet site

Flat sawn

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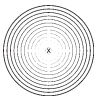
Standard Trade Name

YELLOW POUI / IPÊ

Quarter sawn



Cross cut

Vernacular names	Ipê (Brazil), Amapa (Mexico), Acapro (Venezuela), Lapacho (Argentina), Yellow poui (Trinidad)
Botanical name	*Tabebuia* spp.
Family name	Bignoniaceae
Origin (Distribution)	Central and South America from Mexico and West Indies to Ecuador, and the Caribbean

THE WOOD

Colour	Heartwood olive brown with lighter or darker streaks, often covered with a yellow powder, looks rather oily; sapwood yellowish white, well differentiated.
Weight	Very heavy (Air-dry specific gravity 0.96-1.20 with average value of 1.08)
Grain	Straight to interlocked

Texture Fine to medium

Strength Very strong

Moisture Content	Static Bending		Compression parallel to grain
	Modulus of Rupture (MOR) N/mm^2	Modulus of Elasticity (MOE) N/mm^2	Maximum Crushing Stress (MCS) N/mm^2
Air-dry (12%)	194	21137	91.4

Drying and shrinkage Dries easily; Shrinkage- radial (6.6%), tangential (7.4%), volumetric (14.0%).

Durability Very durable

Treatability Extremely resistant

Working properties Planing- fairly difficult; Boring- rather easy; Turning- difficult; Nailing- good but pre- boring necessary; Finish- good

Typical uses A strong , tough and resilient wood used for building construction, furniture, interior joinery, cabinet work, window and door frames, plywood and veneer, tool handles, turnery, industrial flooring, textile mill items, naval uses, musical instruments, truck bodies and wagons.

Price (Rs. per m^3) Log: 14000-18000

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William A. Lincoln. 1986. World Woods in Color. Macmillan Publishing Company, New York. 320p.

Glossary

air-dry moisture content

The equilibrium moisture content of wood for conditions outdoors but under cover; see also **seasoning**.

air-seasoning

see **seasoning**.

annual ring

Layer of wood laid down during a single growing season. In the temperate wood, the growth rings are readily distinguishable because of differences in the cells formed during the early and late part of the season. In some of the temperate and most of the tropical wood, the annual growth rings are not easily distinguished, same as **growth ring**.

bird's-eye figure

Figure on the flat-sawn and rotary-cut surface of wood exhibiting numerous rounded areas resembling a bird's eye; common in *Pinus ponderosa*

bole

The main stem of a tree.

brittle heart

A defective core in hardwoods due to growth stresses resulting from the presence of fibres with localized wrinkles (abnormal tissue zones) that cause reduction in strength of the wood as well as serious splitting due to different rates of drying.

brown-rot fungi

A type of wood-destroying fungus that decomposes cellulose and the associated carbohydrates, leaving the lignin in a more or less unaltered state and appears as a brown crumbly powdery matrix.

coarse-textured wood

Wood with wide conspicuous growth rings with larger pores.

compression parallel to grain (maximum compression strength-MCS)

This property measures the ability of the timber to withstand loads when applied on the end grain. Values are given in N/mm^2

cross- grain

Wood in which the fibres deviate from a line parallel to the sides of the piece. Cross-grain may be either diagonal or spiral or a combination of the two.

cross-cut

To cut across the grain of wood.

curly grain

Grain that result from more or less abrupt and repeated right and left deviations from the vertical, in fibre alignment.

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Alan batu (Heavier) 6	Giam (*Hopea* spp.), Red Balau (*Shorea* spp.), Indian Sal (*Shorea robusta*)
Ash, American 8	European Ash (*Fraxinus excelsior*)
Ash, European 10	European beech (*Fagus sylvatica*)
Balau, Red (Heavier) 14	Selangan batu (*Shorea* spp.), Giam (*Hopea* spp.)
Balau/ Selangan batu (Heavier) 16	Red Balau (*Shorea* spp.), Giam (*Hopea* spp.), Indian Sal (*Shorea robusta*)
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Iroko 48	Teak (*Tectona grandis*)
Kapur 50	Keruing (*Dipterocarpus* spp.)
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