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/mm²*)
- b. Moderately strong (Compression parallel to grain: 28-41 N/mm²)
- c. Strong and very strong (Compression parallel to grain: above 41 N/mm²)

**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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**References**


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*1N/mm² (1 newton per square millimeter) = 1 MPa (1 mega pascal) = 10.2 Kg/cm² (10.2 kilogram per square centimeter)*
ACACIA / EAR-POD WATTLE

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

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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 m³)
Log: 6000-11000

Additional reading


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

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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 m³)
Log: 23000

Additional reading


TEAK

**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 Caribbean.

**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

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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 1 general 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.


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
Teak - Ivory Coast
Teak - Togo
Benin Teak
Burma Teak
Malaysian Teak

Quarter sawn
Quarter sawn
Flat sawn

Quarter sawn
Quarter sawn
Flat sawn
Columbian Teak

Teak - Costa Rica

Teak - Ecuador

Home garden Teak - Dry site

Thailand Teak

Home garden Teak - Wet site
Additional reading


YELLOW POUI / IPÊ

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

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<td>Air-dry (12%)</td>
<td>194</td>
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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 m³): Log: 14000-18000

Additional reading


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/mm²

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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<td>Imbuya 46</td>
<td>Walnut (Juglans spp.),</td>
</tr>
<tr>
<td>Iroko 48</td>
<td>Teak (Tectona grandis)</td>
</tr>
<tr>
<td>Kapur 50</td>
<td>Keruing (Dipterocarpus spp.)</td>
</tr>
<tr>
<td>Kempas 56</td>
<td>Tualang (Koompassia excelsa)</td>
</tr>
<tr>
<td>Keruing 58</td>
<td>Indian Gurjan (Dipterocarpus indicus)</td>
</tr>
<tr>
<td>Mahogany, American 66</td>
<td>Spanish Mahogany (Swietenia mahogani)</td>
</tr>
<tr>
<td>Meranti bakau 74</td>
<td>Dark red meranti (Shorea spp.)</td>
</tr>
<tr>
<td>Merbau / Kwila 78</td>
<td>Indian Bijasal (Pterocarpus marsupium)</td>
</tr>
<tr>
<td>Merpauh 80</td>
<td>Indian Swintonia (Swintonia floribunda)</td>
</tr>
<tr>
<td>Oak (Red), American 92</td>
<td>White oak (Quercus alba)</td>
</tr>
<tr>
<td>Oak (White), American 94</td>
<td>European oak (Quercus robur)</td>
</tr>
<tr>
<td>Padauk, African 98</td>
<td>Malaysian Padauk (Narr) (Pterocarpus indicus)</td>
</tr>
<tr>
<td>Padauk, Burma 100</td>
<td>Andaman Padauk (Pterocarpus dalbergioides)</td>
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<tr>
<td>Parambali / Karvelam 104</td>
<td>Khair (Acacia catechu)</td>
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<tr>
<td>Pine, Red 114</td>
<td>European red pine (Pinus sylvestris)</td>
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<tr>
<td>Pyinkado 120</td>
<td>Itrl (Xyila xylocarpa)</td>
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<tr>
<td>Resak 122</td>
<td>Balau (Shorea spp.), Giam (Hopea spp.)</td>
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<tr>
<td>Shibidan / Peroba rosa 132</td>
<td>Mahogany</td>
</tr>
<tr>
<td>Sissoo 136</td>
<td>Rosewood (Dalbergia latifolia)</td>
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<tr>
<td>Taukkyan 140</td>
<td>Indian Laurel (Terminalia crenulata)</td>
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<tr>
<td>Tualang 150</td>
<td>Kempas (Koompassia malaccensis)</td>
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<tr>
<td>Vitex 154</td>
<td>Indian Millia (Vitex altissima)</td>
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<tr>
<td>Walnut, European 156</td>
<td>Black American walnut (Juglans nigra)</td>
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