COCOTIER

Family: ARECACEAE (angiosperm)

Scientific name(s): Cocos nucifera

Commercial restriction: no commercial restriction

Note: COCONUT TREE is a monocotyledon. The material of the stipe (trunk) is falsely called wood by analogy with Gymnosperms' and Angiosperms' wood. It has neither sapwood nor heartwood. Only the outlying crown has wood characteristics.

WOOD DESCRIPTION

Color: red brown

Sapwood: absent

Texture: coarse

Grain: straight to entangled

Interlocked grain: absent

Note: Beige to pinkish beige, punctuated with or criss-crossed by red-brown to dark brown fibres, whatever the stock orientation. Proportion of fibre grows from the heart to the outer of the stem.

LOG DESCRIPTION

Diameter: from 30 to 60 cm

Thickness of sapwood:

Floats: no information available

Log durability: low (must be treated)

PHYSICAL PROPERTIES

Physical and mechanical properties are based on mature heartwood specimens. These properties can vary greatly depending on origin and growth conditions.

	Mean	Std dev.
Specific gravity *:	0,90	
Monnin hardness *:	8,3	
Coeff. of volumetric shrinkage:	0,52 %	
Total tangential shrinkage (TS):	6,1 %	
Total radial shrinkage (RS):	5,6 %	
TS/RS ratio:	1,1	
Fiber saturation point:	23 %	

Stability: moderately stable

Note: Stem with a very soft and fibrous heart with a great variation of density (along with other properties) from the heart to the periphery (in a ratio of 1 to 5 for density). The material giving the best properties is at the periphery of the stem. This peripheral part has the same end-uses as wood. The indicated values are those of the material taken from this zone.

MECHANICAL AND ACOUSTIC PROPERTIES

	Mean	Std dev.
Crushing strength *:	60 MPa	
Static bending strength *:	82 MPa	
Modulus of elasticity *:	13800 MPa	

(*: at 12% moisture content, with 1 MPa = 1 N/mm²)

Musical quality factor: 97,7 measured at 2263 Hz

NATURAL DURABILITY AND TREATABILITY

Fungi and termite resistance refers to end-uses under temperate climate. Except for special comments on sapwood, natural durability is based on mature heartwood. Sapwood must always be considered as non-durable against wood degrading agents.
E.N. = Euro Norm

Funghi (according to E.N. standards): class 5 - not durable

Dry wood borers: susceptible

Termites (according to E.N. standards): class S - susceptible

Treatability (according to E.N. standards): class 2-3 - poorly to moderately permeable

Use class ensured by natural durability: class 1 - inside (no dampness)

Species covering the use class 5: No

Note: Durability and permeability to preservative products vary greatly with density: wood is denser at the periphery, more durable but less permeable to preservative products.

REQUIREMENT OF A PRESERVATIVE TREATMENT

Against dry wood borer attacks: requires appropriate preservative treatment

In case of risk of temporary humidification: requires appropriate preservative treatment

In case of risk of permanent humidification: use not recommended

DRYING

Drying rate: slow
Risk of distortion: high risk
Risk of casehardening: no
Risk of checking: slight risk
Risk of collapse: yes
Note: Risks of collapse is usually localised in the central area.

Possible drying schedule: 4

M.C. (%)	Temperature (°C) dry-bulb	wet-bulb	Air humidity (%)
Green	42	39	82
50	48	43	74
40	48	43	74
30	48	43	74
15	54	46	63

This schedule is given for information only and is applicable to thickness lower or equal to 38 mm.
It must be used in compliance with the code of practice.
For thickness from 38 to 75 mm, the air relative humidity should be increased by 5 % at each step.
For thickness over 75 mm, a 10 % increase should be considered.

SAWING AND MACHINING

Blunting effect: high
Sawteeth recommended: stellite-tipped
Cutting tools: tungsten carbide
Peeling: not recommended or without interest
Slicing: not recommended or without interest
Note: Variable density from the heart (< 0,25), which is unusable, to the periphery (> 1). The log turning sawing with unique taking of the peripheral stocks is compulsory to obtain pieces with homogeneous characteristics. The rate of silica may be very high. It is hard to have a careful finish because of the entanglement of the fibres.

ASSEMBLING

Nailing / screwing: good but pre-boring necessary
Gluing: correct

COMMERCIAL GRADING

Appearance grading for sawn timbers: Out of recognized grading

FIRE SAFETY

Conventional French grading: Thickness > 14 mm : M.3 (moderately inflammable)
Thickness < 14 mm : M.4 (easily inflammable)

Euroclasses grading: D s2 d0
Default grading for solid wood, according to requirements of European standard EN 14081-1 annex C (April 2009). It concerns structural graded timber in vertical uses with mean density upper 0.35 and thickness upper 22 mm.

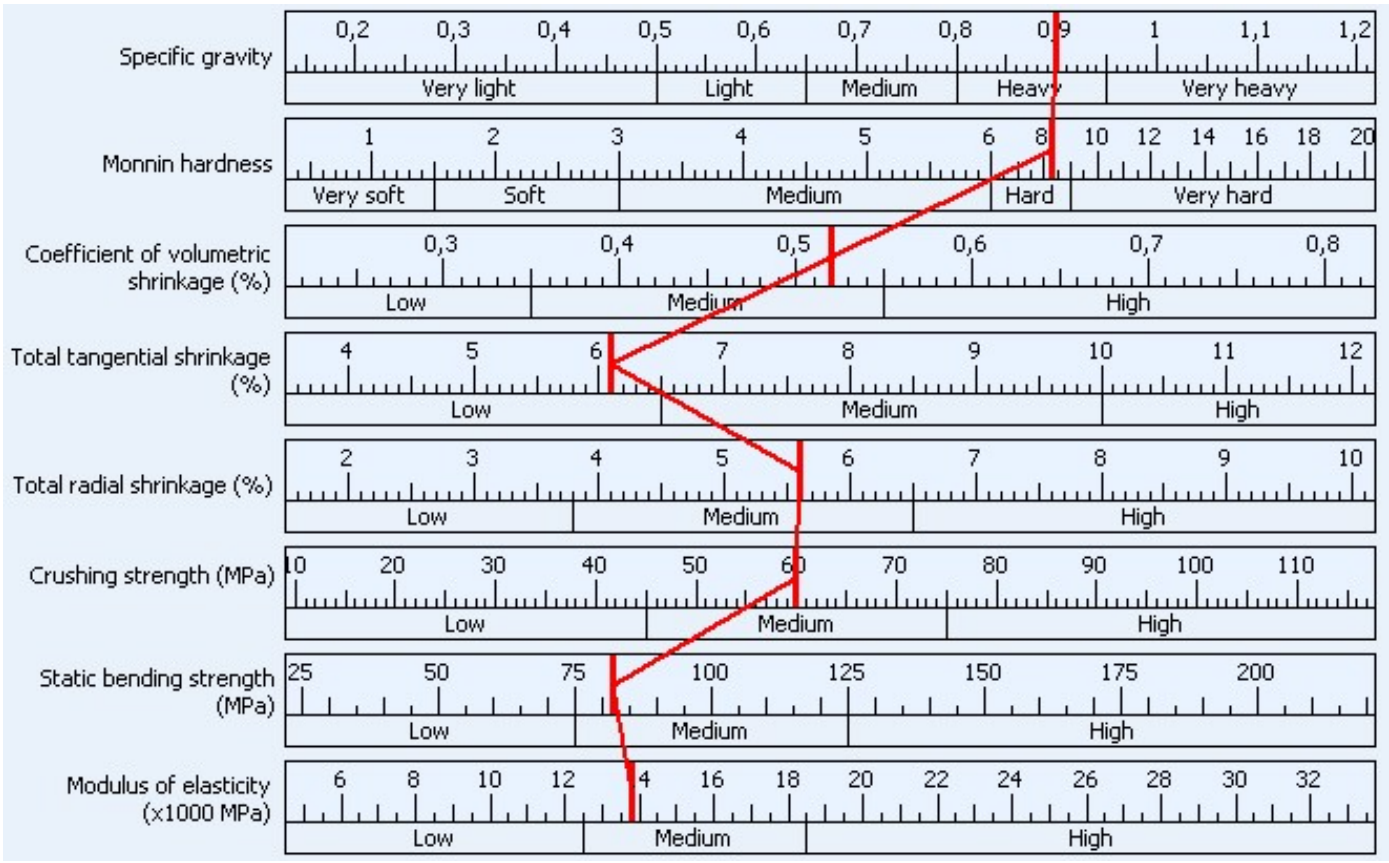
END-USES

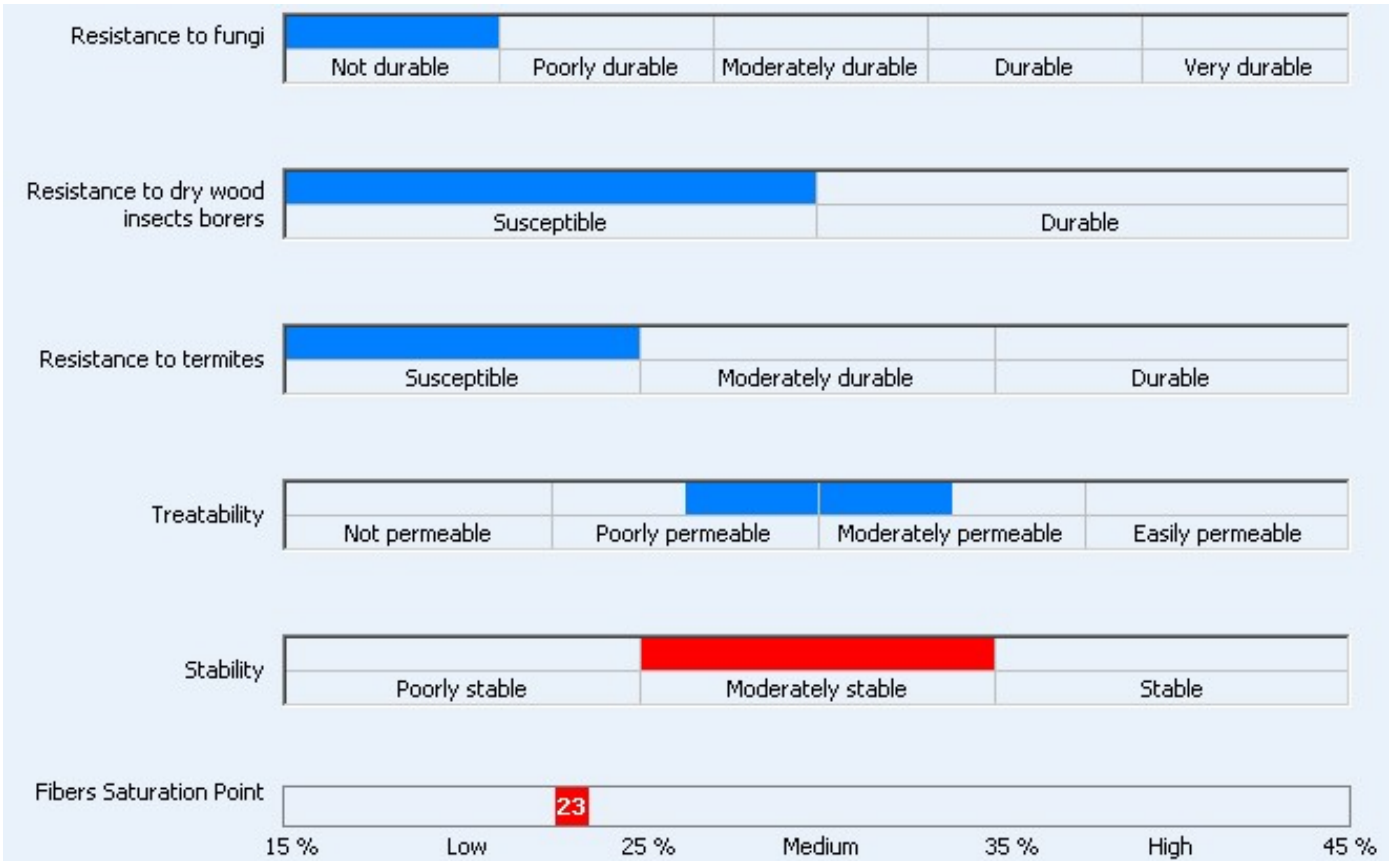
Flooring
Wood-ware
Cabinetwork (high class furniture)
Interior joinery
Current furniture or furniture components
Shingles
Interior panelling
Turned goods
Industrial or heavy flooring
Light carpentry
Blockboard
Insulation

Note: Only the heart, very soft and very fibrous, can be used for isolation.

MAIN LOCAL NAMES

Country	Local name	Country	Local name
Brazil	COQUEIRO	Spain	COCOTERO
France	COCOTIER	Gabon	MBANGA
Indonesia	KELAPA	Peninsular Malaysia	KELAPA
Mexico	COCOTERO	Philippines	NIOG
Portugal	COQUEIRO	United Kingdom	COCONUT
United States of America	COCONUT	United States of America	COCOWOOD
Vietnam	DUA		


Specific gravity
0,2 0,3 0,4 0,5 0,6 0,7 0,8 0,9 1 1,1 1,2
Very light
Light
Medium
Heavy
Very heavy
Monnin hardness
1 2 3 4 5 6 8 10 12 14 16 18 20
Very soft
Soft
Medium
Hard
Very hard
Coefficient of volumetric shrinkage (%)
0,3 0,4 0,5 0,6 0,7 0,8
Low
Medium
High
Total tangential shrinkage (%)
4 5 6 7 8 9 10 11 12
Low
Medium
High
Total radial shrinkage (%)
2 3 4 5 6 7 8 9 10
Low
Medium
High
Crushing strength (MPa)
10 20 30 40 50 60 70 80 90 100 110
Low
Medium
High
Static bending strength (MPa)
25 50 75 100 125 150 175 200
Low
Medium
High
Modulus of elasticity (x1000 MPa)
6 8 10 12 14 16 18 20 22 24 26 28 30 32
Low
Medium
High


Resistance to fungi
Not durable
Poorly durable
Moderately durable
Durable
Very durable
Resistance to dry wood insects borers
Susceptible
Durable
Resistance to termites
Susceptible
Moderately durable
Durable
Treatability
Not permeable
Poorly permeable
Moderately permeable
Easily permeable
Stability
Poorly stable
Moderately stable
Stable
Fibers Saturation Point
23
15 %
Low
25 %
Medium
35 %
High
45 %