ANDIROBA

Family: MELIACEAE (angiosperm)
Scientific name(s): Carapa guianensis
Carapa procera
Commercial restriction: no commercial restriction
Note: Carapa procera may be found in Africa.

WOOD DESCRIPTION

Color: red brown
Sapwood: not clearly demarcated
Texture: medium
Grain: straight or interlocked
Interlocked grain: slight

LOG DESCRIPTION

Diameter: from 50 to 80 cm
Thickness of sapwood: from 3 to 5 cm
Floats: no
Log durability: moderate (treatment recommended)

Note: Buoyancy is variable: ANDIROBA BRANCA (varzea) floats, ANDIROBA VERMELHA (terra firme) does not float.

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 *:	0,67	0,06
Monnin hardness *:	3,5	0,8
Coeff. of volumetric shrinkage:	0,55 %	0,07 %
Total tangential shrinkage (TS):	7,7 %	1,0 %
Total radial shrinkage (RS):	4,8 %	0,9 %
TS/RS ratio:	1,6	
Fiber saturation point:	27 %	
Stability:	moderately stable	

MECHANICAL AND ACOUSTIC PROPERTIES

	Mean	Std dev.
Crushing strength *:	59 MPa	7 MPa
Static bending strength *:	102 MPa	18 MPa
Modulus of elasticity *:	14530 MPa	1736 MPa

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

Musical quality factor: 61 measured at 2976 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 3-4 - moderately to poorly durable
Dry wood borers: susceptible - sapwood not or slightly demarcated (risk in all the wood)
Termites (according to E.N. standards): class M - moderately durable
Treatability (according to E.N. standards): class 3 - poorly permeable
Use class ensured by natural durability: class 2 - inside or under cover (dampness possible)
Species covering the use class 5: No
Note: This species is listed in the European standard NF EN 350-2.

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: normal to slow
Risk of distortion: slight risk
Risk of casehardening: no
Risk of checking: high risk
Risk of collapse: yes
Note: Low temperature and high humidity are recommended during drying.

Possible drying schedule: 5

M.C. (%)	Temperature (°C) dry-bulb	wet-bulb	Air humidity (%)
30	42	41	94
25	42	39	82
20	48	43	74
15	48	43	74

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: normal
Sawteeth recommended: ordinary or alloy steel
Cutting tools: ordinary
Peeling: good
Slicing: nood
Note: Some difficulties in planing in presence of interlocked grain.

ASSEMBLING

Nailing / screwing: good but pre-boring necessary
Gluing: correct
Note: Tends to split when nailing.

COMMERCIAL GRADING

Appearance grading for sawn timbers: According to NHLA grading rules (January 2007)
Possible grading: FAS, Select, Common 1, Common 2, Common 4
In French Guiana, the local name of this species is "CARAPA". Grading is done according to local rules "Bois guyanais classés".
Possible grading: Choix 1, choix 2, choix 3, choix 4

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

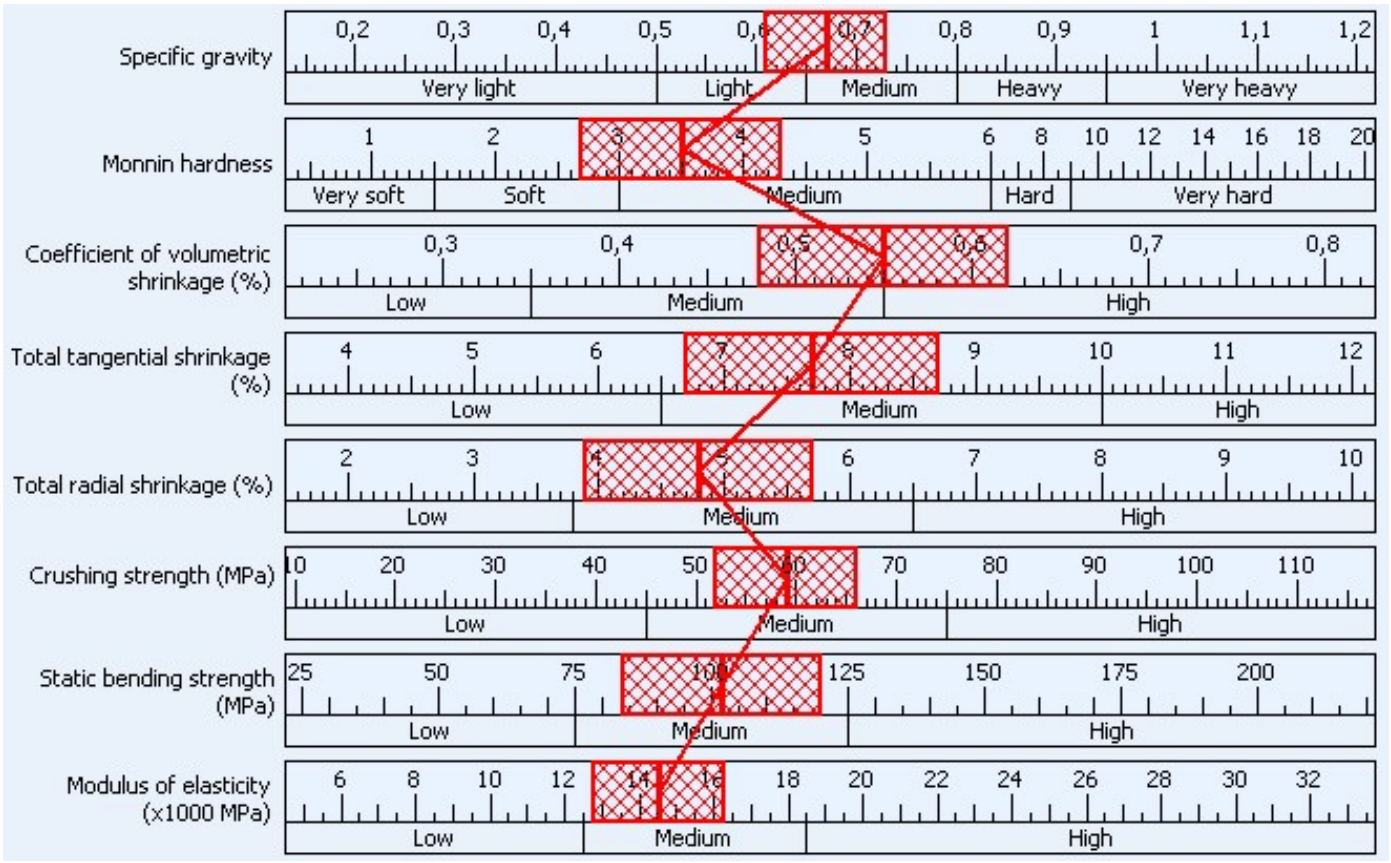
Veneer for back or face of plywood
Cabinetwork (high class furniture)
Exterior joinery
Interior panelling
Stairs (inside)
Glued laminated
Seats
Turned goods
Boxes and crates
Current furniture or furniture components
Sliced veneer
Interior joinery
Flooring
Light carpentry
Exterior panelling
Ship building (planking and deck)
Moulding
Shingles

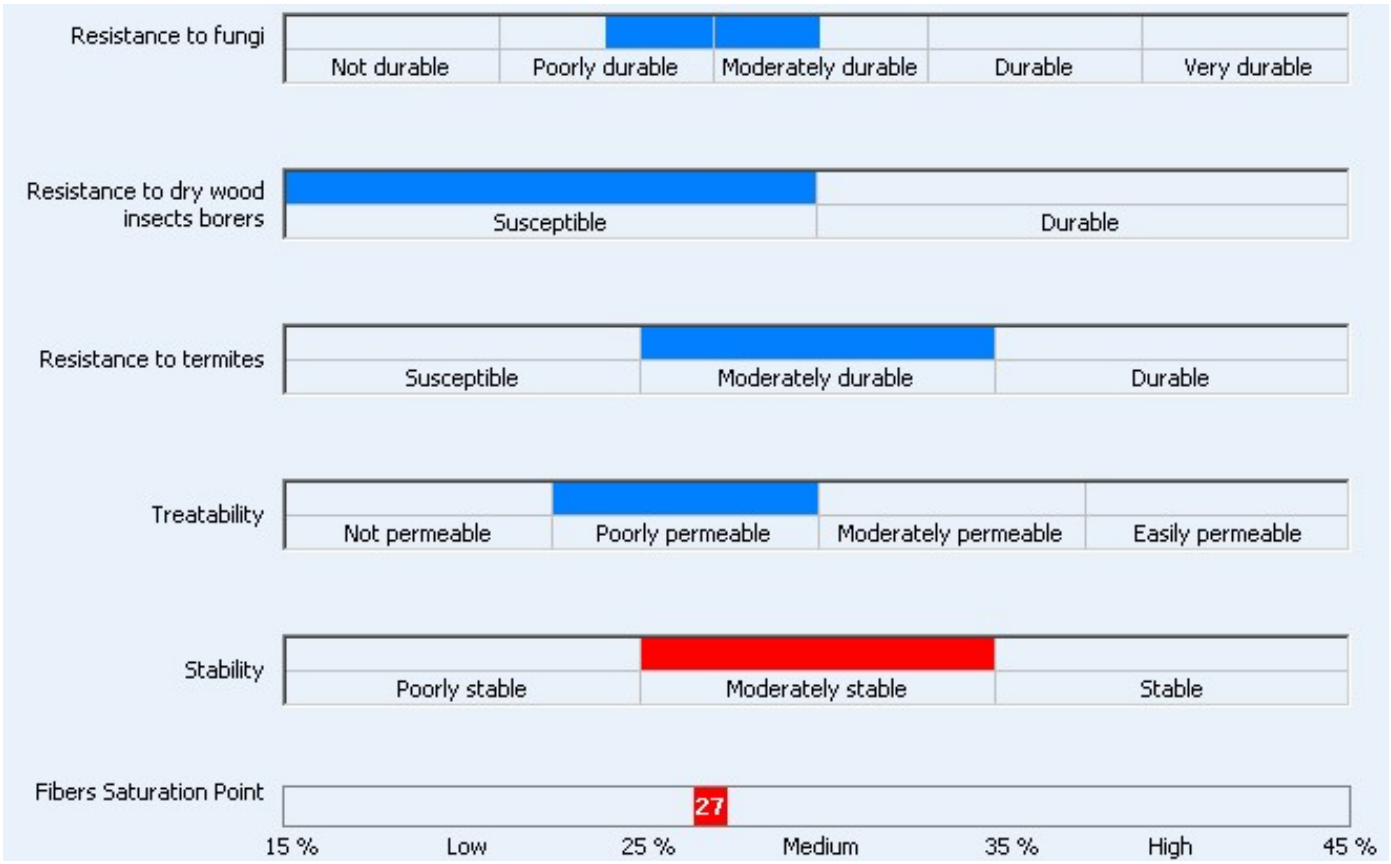
Note: Generally used as substitute for MAHOGANY (Swietenia spp.).

MAIN LOCAL NAMES

Country	Local name
Brazil	ANDIROBA
Brazil	ANDIROBEIRA
Colombia	MASABALO
Costa Rica	CEDRO MACHO
Ecuador	TANGARE
French Guiana	CARAPA
Panama	CEDRO BATEO
Peru	ANDIROBA
Trinidad and Tobago	CRAPPO
Venezuela	MASABALO

Country	Local name
Brazil	ANDIROBA BRANCA
Brazil	CARAPA
Costa Rica	CEDRO BATEO
Ecuador	FIGUEROA
Guyana	CRABWOOD
Honduras	BASTARD MAHOGANY
Paraguay	ANDIROBA
Suriname	KRAPPA
Venezuela	CARAPA


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
27
15 % Low 25 % Medium 35 % High 45 %