**SAPOTACEAE** (angiosperm)

**Family:** SAPOTACEAE  
**Scientific name(s):** Manilkara bidentata  
Manilkara huberi  
**Commercial restriction:** no commercial restriction

### WOOD DESCRIPTION

- **Color:** red brown  
- **Sapwood:** clearly demarcated  
- **Texture:** fine  
- **Grain:** straight  
- **Interlocked grain:** absent  
- **Note:** Dark red brown with purplish shades.

#### LOG DESCRIPTION

- **Diameter:** from 60 to 120 cm  
- **Thickness of sapwood:** from 4 to 6 cm  
- **Floats:** no  
- **Log durability:** good

### PHYSICAL PROPERTIES

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Mean</th>
<th>Std dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific gravity *:</td>
<td>1,10</td>
<td>0,05</td>
</tr>
<tr>
<td>Monnin hardness *:</td>
<td>12,9</td>
<td>2,1</td>
</tr>
<tr>
<td>Coeff. of volumetric shrinkage:</td>
<td>0,75%</td>
<td>0,06%</td>
</tr>
<tr>
<td>Total tangential shrinkage (TS):</td>
<td>9,4%</td>
<td>0,8%</td>
</tr>
<tr>
<td>Total radial shrinkage (RS):</td>
<td>7,1%</td>
<td>0,8%</td>
</tr>
<tr>
<td>TS/RS ratio:</td>
<td>1,3</td>
<td></td>
</tr>
<tr>
<td>Fiber saturation point:</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>Stability: poorly stable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MECHANICAL AND ACOUSTIC PROPERTIES

- **Crushing strength *:** 89 MPa  
- 8 MPa  
- **Static bending strength *:** 170 MPa  
- 18 MPa  
- **Modulus of elasticity *:** 24410 MPa  
- 3274 MPa  
- **Musical quality factor:** 107.7 measured at 2842 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  

- **Fungi (according to E.N. standards):** class 1 - very durable  
- **Dry wood borers:** durable - sapwood demarcated (risk limited to sapwood)  
- **Termites (according to E.N. standards):** class D - durable  
- **Treatability (according to E.N. standards):** class 4 - not permeable  
- **Use class ensured by natural durability:** class 4 - in ground or fresh water contact  
- **Species covering the use class 5:** Yes  

**Note:** This species naturally covers the use class 5 (end-uses in marine environment or in brackish water) due to its high specific gravity and hardness. According to the European standard NF EN 335, performance length might be modified by the intensity of end-use exposition.

### REQUIREMENT OF A PRESERVATIVE TREATMENT

- Against dry wood borer attacks: does not require any preservative treatment  
- In case of risk of temporary humidification: does not require any preservative treatment  
- In case of risk of permanent humidification: does not require any preservative treatment
DRYING

Drying rate: slow
Risk of distortion: high risk
Risk of casehardening: yes
Risk of checking: high risk
Risk of collapse: no
Note: Surface drying prior to kiln drying is recommended.

Possible drying schedule: 5

<table>
<thead>
<tr>
<th>M.C. (%)</th>
<th>Temperature (°C)</th>
<th>Air humidity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>42</td>
<td>41</td>
</tr>
<tr>
<td>25</td>
<td>42</td>
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<td>20</td>
<td>48</td>
<td>43</td>
</tr>
<tr>
<td>15</td>
<td>48</td>
<td>43</td>
</tr>
</tbody>
</table>

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: fairly high
Sawteeth recommended: stellite-tipped
Cutting tools: tungsten carbide
Peeling: not recommended or without interest
Slicing: nod
Note: Requires power.

ASSEMBLING

Nailing / screwing: good but pre-boring necessary
Gluing: correct (for interior only)
Note: Gluing requires care (very dense wood).

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 "BALATA FRANC". 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

Hydraulic works (fresh water) Bridges (parts in contact with water or ground)
Sleepers Poles
Stakes Wood frame house
Sliced veneer Stringed instruments (bow)
Ship building (planking and deck) Arched goods
Sculpture Tool handles (resilient woods)
Turned goods Shingles
Industrial or heavy flooring Heavy carpentry
Stairs (inside) Current furniture or furniture components
Bridges (parts not in contact with water or ground)
Note: In Brazil, M. elata and M. longifolia are used for pulpwood.
### MAIN LOCAL NAMES

<table>
<thead>
<tr>
<th>Country</th>
<th>Local name</th>
<th>Country</th>
<th>Local name</th>
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<tr>
<td>Brazil</td>
<td>MAÇARANDUBA</td>
<td>Brazil</td>
<td>MAPARAJUBA</td>
</tr>
<tr>
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<td>PARAÍBU</td>
<td>Colombia</td>
<td>BALATA</td>
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<td>NISPERO</td>
<td>Guyana</td>
<td>BALATA</td>
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<tr>
<td>Guyana</td>
<td>BEEFWOOD</td>
<td>Guyana</td>
<td>BULLET WOOD</td>
</tr>
<tr>
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<td>French Guiana</td>
<td>BALATA GOMME</td>
</tr>
<tr>
<td>French Guiana</td>
<td>BALATA ROUGE</td>
<td>French Guiana</td>
<td>BOIS ABEILLE</td>
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<td>NISPERO</td>
<td>Peru</td>
<td>PAMASHTO</td>
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<td>Suriname</td>
<td>BOLLETRIE</td>
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<td>MASSARANDU</td>
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<td>BEEFWOOD</td>
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<tr>
<td>United States of America</td>
<td>BULLET WOOD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Maçaranduba

- **Specific Gravity**
  - 0.2 to 0.4: Very light
  - 0.4 to 0.6: Light
  - 0.6 to 0.8: Medium
  - 0.8 to 1.0: Heavy
  - 1.0 to 1.2: Very heavy

- **Monnin Hardness**
  - 1 to 2: Very soft
  - 2 to 3: Soft
  - 3 to 4: Medium
  - 4 to 5: Hard
  - 5 to 6: Very hard

- **Coefficient of Volumetric Shrinkage (%)**
  - 0.3 to 0.4: Low
  - 0.4 to 0.5: Medium
  - 0.5 to 0.6: High

- **Total Tangential Shrinkage (%)**
  - 4 to 5: Low
  - 5 to 6: Medium
  - 6 to 7: High

- **Total Radial Shrinkage (%)**
  - 2 to 3: Low
  - 3 to 4: Medium
  - 4 to 5: High

- **Crushing Strength (MPa)**
  - 0 to 20: Low
  - 20 to 40: Medium
  - 40 to 100: High

- **Static Bending Strength (MPa)**
  - 25 to 75: Low
  - 75 to 125: Medium
  - 125 to 200: High

- **Modulus of Elasticity (≤1000 MPa)**
  - 6 to 8: Low
  - 8 to 10: Medium
  - 10 to 12: 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**
  - 15% Low
  - 25% Medium
  - 35% High
  - 45%