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Thermal modification on *Eucalyptus* wood: an essay

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Portugal

⇒ 3.46 millions ha of forest ⇒ 38.8% of national territory

⇒ 739 515 ha of Eucalypt plantations ⇒ 23% of forested area

✓ Eucalypts are important species in Portugal's forestry (the 2nd forest species in forest area), due to their economic relevance for pulp&paper production (6.15 million m³ annual consumption).

✓ In Portugal, eucalypt timber is not commonly used for its solid wood value (whether for carpentry or furniture) and research is consequently focused on pulp production.

Objective

Evaluation of wood strength properties of *Eucalyptus globulus* and *Eucalyptus botryoides* subjected to heat treatments with low energy input.



Extra improvement of wood properties

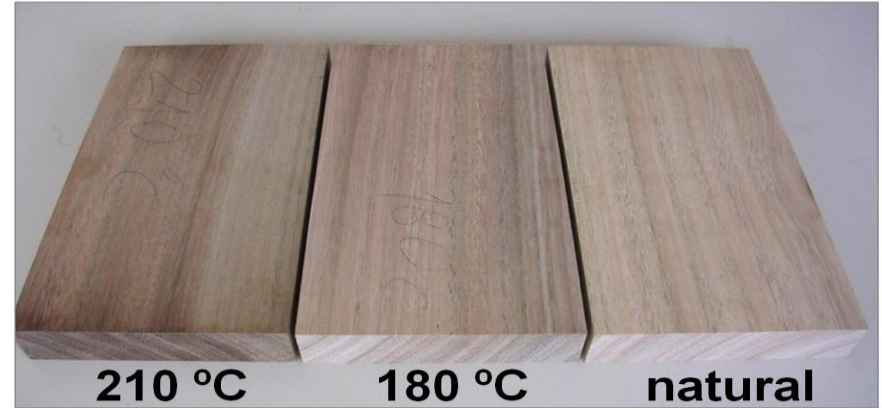


Application of an innovative heat treatment (under patent submission) was carried out using non-oxidative conditions and a new heat transfer medium.

Samples were introduced in a metallic box with an "inert" material (maximum 2 % oxygen).

The box was closed with an appropriate cover and put in a laboratorial oven with internal ventilation.

Colour change on eucalyptus thermally modified



Physical properties

Eucalyptus	Density [kg/m ³]	Tangential shrinkage [%]	Radial shrinkage [%]	Weight loss [%]
Natural	756	16.7	7.5	---
Modified 180 °C	730	10.0	8.6	3
Modified 210 °C	718	12.4	6.2	5

→ Weight loss of modified wood in comparison to natural wood was not negligible

↘ Increase on dimensional stability, both in tangential and radial directions compared to natural wood

Mechanical properties

Eucalyptus	Bending modulus of elasticity [MPa]	Bending rupture [MPa]	Bending deflection at rupture [mm]
Natural	13259	167.6	9.0
Modified 180 °C	11361	140.2	8.3
Modified 210 °C	13840	90.1	4.9

→ Small variation on modulus of elasticity

→ Large drop on bending strength and deflection on bending rupture

↓ The modified material has tendency to unexpected break (brittle fracture) which must be taken into account during structural calculations.

Possibility of successful thermal modification of eucalypt wood.

Need to increase the duration of treatment, since the colour difference and other characteristics were not as as high as those obtained for other species subjected to the same treatment.

Thank you for your attention!

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