

tionally, taper functions and DAP measurements to define the regions of the profiles corresponding to each one of the past ages (2 and 4 years). Trees provided by Duraflora S.A. were sampled for each of the ages studied covering two clones (C1 - higher productivity and C2 - lower productivity) and two distinct regions (I - Itapetininga and LP - Lençóis Paulista - both at Sao Paulo State, Brazil), ranked by the company as higher performance and lower one, respectively.

Densitometric profiles (apparent density - 12% MC - and, indirectly, basic density) from discs along the 6 years old trees height were obtained by the gamma ray attenuation method. Subsequently, based on measurements of stem diameter along the height for 2 and 4 years old trees, taper functions were adjusted, allowing establishing the regions of the original densitometric profiles corresponding to each of the past ages. The weighted average basic density of trees in each of the situations and ages studied were calculated, finally, using the formulation of Pronin.

The results indicated that 6 years old trees of clones C1 and C2 of the region of Lençóis Paulista (LP) had weighted average basic density of 465 kg/m³ and 425 kg/m³, while the same clones in Itapetininga (I) region had 417 kg/m³ and 397 kg/m³. For the ages of 2 and 4 years clones C1 and C2 from the region of Lençóis Paulista (LP) also had higher weighted average basic density related to Itapetininga (I) region clones densities. The results indicated that the gamma ray method was an effective tool for determining the local density as well as complete and partial disc densities, allowing estimation of density at past ages. It was detected the increase of the weighted average basic density from 2 to 6 years, with higher percentage increases in the period from 2 to 4 years when related to the period from 4 to 6 years.

Keywords: Density; Eucalyptus spp.; taper functions; wood quality; precocious selection.

OP020

Classifying White Rot and decay resistance of some hardwoods from Sarawak and Peninsular Malaysia and correlations with their Tropical in-ground durability

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White rot wood decay under Malaysian terrestrial conditions pose serious threats to the in-ground service life of timbers besides soft rot and termite threats. A study is made on decay resistance variation for a total combined list of 30 Peninsular Malaysian and Sarawak timber species (plus 6 exotic reference temperate commercial woods) using the laboratory soil-block decay test method of ASTM D 2017, challenged with a representative virulent Malaysian white rot Basidiomycete *Pycnoporus sanguineus*. Results showed, among the wood species, that *Hevea brasiliensis* (rubberwood) suffered the most severe wood decay with average percentage mass loss of 43.9%, and regarded as non-durable. On the other scale, there was expectedly negligible decay of the most durable species *Eusideroxylon zwageri* (belian) heartwood with mean mass loss of only 0.66 %. The remaining species varies between non-durability and

moderately high durability, but mainly moderately durable on the American ASTM 2017 and European EN350-1 decay resistance classification scales. Correlation between tropical in-ground durability (from available Peninsular Malaysian, Sarawak and stake test results) of these species and laboratory decay resistance was established demonstrating the extent of influence of fungal decay versus other biotic factors (presumably termites) to in-ground natural durability. Comparative variation of the white rot decay resistance among the timber species will augment the existing pool of information on wood quality classifications of some tropical timbers that are currently sought by the international timber trade, as well as detecting promising relatively decay resistant lesser-utilised species that the forest products industry may also be inclined to utilize in addition to the popular traditional species.

Keywords: Decay resistance, natural durability, decay test, ASTM D 2017, white rot, *Pycnoporus sanguineus*, Malaysian timbers

OP021

Investigations on the durability of two secondary Pine species (*Pinus halepensis*, *Pinus uncinata*) within the scope of the European natural durability standards revision

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Under the constant pressure to use timber, some wood species, previously considered as secondary and not economically important, are now taken into consideration. Two Pine species, Aleppo Pine (*Pinus halepensis*) and Mugo Pine (*Pinus uncinata*) are amongst these secondary timbers. While Aleppo Pine is usually reported as having a low natural durability, Mugo Pine is described as durable despite a lack of clear and/or consistent data on this crucial property for their end-uses.

Aleppo Pine (from Morocco) and Mugo Pine (from France and Spain) were studied for their durability towards both fungi and termites. The tests were performed with or without accelerated ageing (leaching) according to the methods described in the EN 350-1 (Guide to the principles of testing and classification of the natural durability of wood) and normative documents associated to its revision.

The results obtained are discussed within the scope of the European tests standards. Tests methods are compared and a proposal for these timbers classification is given for a future notification in the "Technical guide to natural durability and treatability of selected wood species of importance in Europe", former EN 350-2.

Keywords: *Pinus halepensis*, *Pinus uncinata*, Natural durability, Fungi, Termites, Standards and test methods



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