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Title : PROPERTIES OF UNTREATED AND ALKALINE TREATED KELEMPAYAN (*Neolamarckia cadamba*) PARTICLEBOARD

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Kelempayan is a fast-growing species which provides both opportunities to satisfy the increasing need for wood composites and contribute to reduce environmental issues. The main objective of this study is to determine the properties of Kelempayan particleboard under the laboratory conditions and to evaluate the potentials of Kelempayan wood. Alkaline treatment was conducted to remove barrier for the interaction of particle and resin to develop particleboard with better physical and mechanical properties. The effect of alkaline treatment on chemical properties of Kelempayan, physical and mechanical properties of particleboard were determined. Samples for the physical properties evaluation were prepared from three portions, bottom, middle and top, at near pith, intermediate and near bark radial positions of the tree. Sampling and preparation of samples for physical and chemical analysis were conducted according to the standard Technical Association of the Pulp and Paper Industry USA (TAPPI) T 208 om-94 (1996). In the manufacture of untreated and treated particleboards, Kelempayan wood was used as the raw material and phenol formaldehyde (PF) resin as a binder. This experimental design involved four essential variables, namely, particle size, board density, resin content and hot press temperature for untreated boards. The variables involved in manufacturing of treated boards were particle size and alkaline concentration. Bending strength, internal bond strength and thickness swelling tests were evaluated for particleboards performance. Preparation of test samples and evaluation of board performance were carried out according to Malaysian Standard (MS, 2005). From this study, the statistical analysis revealed that tree portion and radial position significantly affect the physical properties. Chemical properties from bottom to top portion of the tree did not show any significant difference. For particle analysis, particle size was found to affect particle geometric characteristics. In the manufacture of untreated particleboards, all parameters including particle size, board density, resin content and hot press temperature had significant effect on physical and mechanical properties of boards. For chemical analysis of treated samples, alkaline concentration had significant effect on chemical composition. In manufacturing of treated particleboards, both main parameters of particle size and alkaline concentration significantly affect the physical and mechanical properties of the boards. It was concluded that alkaline treatment was effective to improve mechanical and dimensional stability of particleboards from Kelempayan wood. Correlation of particle characteristics, physical and chemical properties had less association with board properties. Regression analysis of the data revealed that there is a very good relationship between the manufacturing parameters and board properties.