

Properties of Bark Particleboard Bonded with Demethylated Lignin Adhesives Derived from *Leucaena leucocephala* Bark

ABSTRACT

Lignin extraction from bark can maximize the utilization of biomass waste, offer cost-effectiveness, and promote environmental friendliness when employed as an adhesive material in bark particleboard production. Particles of fine (0.2 to 1.0 mm), medium (1.0 to 2.5 mm), and coarse (2.5 to 12.0 mm) sizes, derived from the bark of *Leucaena leucocephala*, were hot-pressed using a heating plate at 175°C for 7 min to create single-layer particleboards measuring 320 mm × 320 mm × 10 mm, targeting a density of 700 kg/m³. Subsequently, the samples were trimmed and conditioned at 20°C and 65% relative humidity. In this study, we compared bark particleboard bonded with urea formaldehyde (UF) adhesive to fine-sized particleboard bonded with demethylated lignin adhesive. The results indicated that bark particleboards utilizing demethylated lignin and UF adhesives exhibited similar qualities. Coarse particleboard showed differences in modulus of elasticity (MOE) and modulus of rupture (MOR), while medium-sized particles exhibited significant variations in moisture content (MC) and water absorption (WA). Furthermore, the thickness swelling of coarse and medium-sized particles under wet and oven-dried conditions exhibited notable distinctions. Overall, the demethylated lignin adhesive extracted from *L. leucocephala* bark demonstrated similar quality to UF adhesive, with particle size correlating inversely to the strength of the bark particleboard.