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EFFECT OF DIFFERENT CONFIGURATIONS ON THE PROPERTIES OF HYBRID LAMINATED BAMBOO-OIL PALM TRUNK COMPOSITES

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Abstract

Advancements in hybrid laminated composite production have increased the value of bamboo and oil palm trunk (OPT) materials, enabling the development of renewable resource-based composites. This study evaluates the effect of bamboo-OPT configuration on the properties of hybrid laminated bamboo-OPT composites. Two Malaysian commercial bamboo species, namely semeliang (*Schizostachyum grande*) and semantan (*Gigantochloa scortechinii*), along with OPT veneer, were used. Various configurations of three-layer laminated mono-species bamboo, OPT, and hybrid bamboo-OPT composites specifically semeliang-OPT (SM-O) and semantan-OPT (SN-O) with dimensions of 9 mm (thickness) × 300 mm (width) × 300 mm (length) were fabricated using an impregnation modification method with low molecular weight phenol formaldehyde resin (LMwPF). The physical, bonding shear, and mechanical properties of the composites were evaluated. Results

showed that the hybrid SM-O composite had the lowest thickness swelling of 1.55% and water absorption of 10.01% after 24 h immersion, indicating superior dimensional stability. In terms of bonding performance, SM-O achieved shear strengths of 2.94 N/mm² after 24 h soaking and 2.11 N/mm² after boil-dry-boil treatment, meeting the minimum standard requirement. For mechanical performance, SM-O displayed the highest modulus of rupture (MOR) at 189.08 N/mm² and modulus of elasticity (MOE) at 28,627 N/mm², outperforming both mono-species bamboo and OPT composites. © Forest Research Institute Malaysia

Author keywords

Bamboo; impregnation modification; oil palm trunk veneer; phenolic resin

Indexed keywords

Engineering controlled terms

Elastic moduli; Forestry; Hybrid materials; Impregnation; Laminated composites; Laminating; Natural resources; Samarium compounds; Shear flow; Shear strength; Veneers

Engineering uncontrolled terms

Bamboo species; Impregnation modification; Laminated bamboo; Malaysians; Oil palm trunk veneers; Oil palm trunks; Phenolics; Property; Renewable resource; Resources based

Engineering main heading

Bamboo; Water absorption

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