**Influence of glycerol-maleic anhydride treatment on dimensional stability, mechanical properties, and durability of short rotation teak wood**

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*Abstract:* The supply of long rotation teak wood (*Tectona grandis* Linn. f) has been declining year after year. Short rotation teak wood has been produced to overcome the reduction source of long rotation teak. The short rotation teak has low quality, especially in dimensional stability and durability. Glycerol-maleic anhydride (GMA) treatment as non-biocidal wood preservation system was applied to improve technological properties especially dimensional stability and durability of the short rotation teak wood. In this study, short rotation teak sapwood (15 years) was treated through the impregnation process of 10% w/w aqueous solution of GMA followed by thermal modification at 150 and 220 °C for 20h under nitrogen atmosphere. The following technological properties were studied: mass alteration; density; leachability; dimensional stability (volumetric swelling, anti-swelling efficiency (ASE), and water uptake (WU)); modulus of elasticity (MOE); modulus of rupture (MOR); decay resistance; and termite resistance. The results show that chemical modification with 10% GMA combined with thermal modification increased ASE of 62.31% and 73.22% for 150 and 220 °C respectively, indicating improved in dimensional stability. The thermal treatment and combination of GMA-thermal treatment decrease the value of both MOE and MOR. Decay resistances (durability) of GMA-thermal treated teak wood against fungal decay were categorized to be class 1 (very durable). Weight loss of GMA-thermal at 220 °C against termite attacks was 0.19%, which presented excellent durability (rating 10) against subterranean termites. GMA-thermal treatment gave a significant improvement in dimensional stability and resistance to wood-decaying fungi and termite.

*Keywords: dimensional stability, glycerol, maleic anhydride, short rotation teak wood, fungal and termite resistance*