

## MECHANICAL AND BIOLOGICAL PERFORMANCE OF SODIUM METAPERIODATE-IMPREGNATED PLASTICIZED WOOD (PW)

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Malaysia, especially the Borneo Island state of Sarawak, has a large variety of tropical wood species. In this study, selected raw tropical wood species namely *Artocarpus Elasticus*, *Artocarpus Rigidus*, *Xylopia* spp., *Koompassia Malaccensis*, and *Eugenia* spp. were chemically treated with sodium metaperiodate to convert them into plasticized wood (PW). Manufactured plasticized wood samples were characterized using, Fourier transform infrared spectroscopy, scanning electron microscopy, and mechanical testing (modulus of elasticity (*MOE*), modulus of rupture (*MOR*), static Young's modulus ( $E_s$ ), decay resistance, and water absorption). *MOE* and *MOR* were calculated using a three-point bending test.  $E_s$  and decay resistance were calculated using the compression parallel to grain test and the natural laboratory decay test, respectively. The manufactured PW yielded higher *MOE*, *MOR*, and  $E_s$ . PW had a lower water content compared to the untreated wood and had high resistance to decay exposure, with *Eugenia* spp. having the highest resistance compared to the others.

*Keywords: Mechanical properties; Decay resistance; Chemical treatment; Plasticized wood*

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### INTRODUCTION

Growing environmental awareness and new rules and regulations are forcing industries to seek more ecological friendly materials for their products (Oksman et al. 2003). Plasticized wood products, which are environmental friendly, have low moisture absorption and high resistance to decay, insects, and ultraviolet ray damage, have become one of the fastest-growing categories of materials in the wood industry (Kim et al. 2008). Plasticized wood has been extensively used for automotive and building products, packing materials, and other applications (Youngquist 1995). Over the years, wood has been treated with a variety of chemicals such as styrene, epoxy resins, urethane, phenol formaldehyde, methyl methacrylate (MMA), and vinyl or acrylic monomers to change its physical and mechanical properties. Modifiers such as solvents, plasticizers, and resins have also been added to the monomer, as well as dyes, antioxidants or salts, to modify the final properties. Such modified wood is not only more resistive against water absorption, but also has much improved mechanical properties, in particular strength. The advantages in using these chemicals include improvements in the physical, mechanical, thermal, and biological properties. By contrast, the disadvantages are relatively minor, such as changes relative to the natural color.