

Relationship between physical, anatomical and strength properties of 3-year-old cultivated tropical bamboo *Gigantochloa Scortechinii*

Abstract

The physical, anatomical and strength properties of 3-year-old cultivated tropical bamboo *Gigantochloa scortechinii* was studied. Five (5) culms of the bamboo were selected and harvested from the Bambusetum plot located in the Forest Research Institute Malaysia in Kepong. The anatomical study focussed on the vascular bundles and fibres located at the internodes and nodes No. 8 at the outer, middle and inner cross section of the bamboo. The sizes of the vascular bundles length, vascular bundles width, fiber length, fiber diameter, fiber lumens diameter, fiber walls thickness and fiber Runkle's ratio were measured in relation to the samples positions at the internodes, nodes, and positions in the cross-section of the bamboo culms. The physical study gives emphasis on the moisture content, basic density and dimensional stability. The strength properties study focused on the tension parallel to the grain and shear test. Both the physical and strength study were conducted at internodes and nodes No. 8 of the bamboo.

INTRODUCTION The timber production from the natural tropical forests will continue to be on the decline despite the increase in the world population and the market demand by the wood-based industry in Malaysia. The timber supply from the plantation could not cope with the growing demand for timbers. Bamboo, a fast-growing species reaches maturity within 3 -4 years can provide material to replace timber in the coming future. Research and development which covers all aspects in bamboo silviculture, propagation, processing, properties and utilization of bamboo found naturally growing wild in the forest and cultivated has been intensified. However, study on cultivated bamboo stands has so far mostly confined to selected species in silviculture and fertilizers application to enhance growing (Azmy et al., 2007). Information on the properties such as anatomical and structural properties is rather limited. The physical and strength properties of bamboo have been widely studied by many researchers all over the world (Li, 2004; Rafidah et al., 2010). However, the information on the relationship between the anatomical, physical and strength

properties of some species in genus *Gigantochloa* is still limited. In this study, a tropical bamboo species *G. scortechinii* was studied. *G. scortechinii* is one of the most popular bamboo species in Malaysia due to its having good physical morphology and strength properties. Assessment of bamboo physical properties such as moisture content, specific gravity, maximum shrinkage (tangential, radial and volumetric, roughness and wet ability has been conducted. Tension parallel to grain, the static bending and compression roller shear test for small size specimens were carried out. Anatomical and physical characteristics of bamboo culms have been known to have significant effects on their durability and strength (Latif and Tamizi, 1993; Liese, 1985; Razak, 1998). Studies on the anatomical and physical properties of cultivated *Bambusa vulgaris* conducted by Razak et al. (2010) support this statement. Information generated on the anatomical properties of bamboo can be used to determine their possible proper utilization. Currently, bamboo used for making traditional products such as handicraft, basketry, and high-value added products of panels, parquets, furniture and construction materials. *G. scortechinii* bamboos are among the most popular tropical bamboo species for plantation. These bamboos are easily cultivated and possess thick culms wall, and having uniform sizes between the nodes and internodes. This makes them suitable as materials for industrial usage. Advancement in the application of bamboo in modern era requires further understanding of the material such as properties of the anatomy, physical and strength at different location and position in the bamboo culms. The objectives of the study was to determine the relationship between the anatomical, physical and strength of 3-year-old bamboo culms of the *G. scortechinii*.