

UNIVERSITI TEKNOLOGI MARA

**SURFACE CHARACTERISTICS, ADHESIVE
PENETRATION ANALYSIS AND BENDING
STRENGTH PROPERTIES OF 2-PLY
LAMINATED BAMBOO STRIPS OF BULOH
SEMANTAN (*Gigantochloa scortechinii*)**



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ABSTRACT

Bamboo is a multipurpose plant that has a centuries-long documented history of application. Its unique properties had qualified it to enthrone as a valuable natural resource with many purposes and hundred of uses. Bamboo composite lumber (BCL) for example, is the most potential non-timber forest product to join wood for various uses. BCL is a reconstituted wood which is made by laminating series of bamboo in a lumber like material with adhesive. In bamboo laminated field, understanding of the adhesive bonding and adhesion characteristics will lead to better utilization of bamboo as a material for composite product. The purposes of this study were to analyze the adhesive penetration of bamboo and its correlation towards the bending strength of laminated bamboo as well as to determine the surface characteristics of the material i.e. the wettability and buffer capacity. Matured Buloh Semantan aged three years old was used for this study. All specimens were tested at 9 to 10% of MC and were performed separately according to its portions, parts and levels of pressure. The average mean pH value of Buloh Semantan is 6.23. The buffer capacity was 0.30 me and it is more acid than of alkali. The phenol-formaldehyde resin was used in this study because Buloh Semantan is more suitable with an alkaline resin, than acid curing resin, urea-formaldehyde. The contact angle of Buloh Semantan using distilled water was not significantly different from portions and parts ($p \geq 0.05$). The average contact angle was 51.84° . Generally, the adhesive penetration was highly significantly different between parts and levels of pressure but slightly significant at different portions. Adhesive penetration was greater with samples from I-I part and bottom portion. For comparison between levels of pressure, it showed that the adhesive penetration is proportionate to the increasing amount of force applied. It continuously increased until it reaches its ultimate load. In the bending strength test, the trend was similar with adhesive penetration for both parts and levels of pressure but differ for portions. The bending strength between portions was also significantly different between each other. However, there were very weak correlation between adhesive penetration and bending strength properties. From the study it can be concluded that the adhesive penetration and bending properties were influenced by properties of bamboo strips and load applied.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Bamboo is a multipurpose plant that has a centuries-long documented history of application. According to Marina et al. (2004), due to its strength, straightness, light weight, hardness, size range, abundance supply and fast growth, bamboo becomes a valuable natural resource which is suitable for many purposes and hundreds of uses. It is important directly or indirectly involved all people around the world, mostly in the developing countries.

Due to the pressure on the ever-shrinking natural forests and the increasing demand in production of timber, parallel to the drastic increased of the world's population; bamboo is potentially the most important non-timber forest product to join wood for wide variety of uses. Based on comprehensive study and research activities, bamboo can be made into wide range of products similar to wood. With this awareness, a number of countries have started to utilized bamboo as material for the commercial uses. Malaysia has also supported this application by recognizing bamboo as the second most important non-timber product after rattan (Aminuddin & Abd. Latif, 1991). Altogether there are about 1250 species of bamboos represented by about 75 genera throughout the world (Soderstorm & Ellis, 1988). In Malaysia for example, there are about 70 known species in 10 genera bamboos and among them, *Gigantochloa scortechinii* or locally known as Buloh Semantan is the most important and extensively used species in Peninsula Malaysia (Hamdan, 2004).