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PROSPECTIVE PROPERTIES OF GIGANTOCHLOA SCORTECHINII (BULUH SEMANTAN) FIBRE FOR BIOCOMPOSITE MATERIAL

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ABSTRACT

Bio-composites are essential materials created from renewable resources that biodegrade and sustainable such as bamboo fibre to produce a new generation of composites for construction industry used. Even though most bamboo grows in forest, there is still a scarcity of data on the morphology, physical, chemical, and mechanical properties of cultivated wild bamboo in Malaysian forest. Hence, the aim of this research is to determine the physical, chemical, and mechanical properties of species *Gigantochloa Scortechinii* (Buluh Semantan) suitable criteria for bio-composite material. The research objective is to analyse the physical and chemical properties of bamboo culm that influenced the mechanical strength of bamboo fibre and the suitability of fibre as bio-composite material. It is revealed that the suitable characteristics of bamboo fibre as bio-composite material are lower in moisture content, higher density, has better mechanical strength such as tensile strength and modulus of elasticity. Thus, this research presents on Sample A and Sample B of Buluh Semantan species that was discover in Royal Belum State Park. Several experimentations were conducted on bamboo fibre and bamboo culm by referring to ISO 22157 and TAPPI standard procedure. From the findings revealed that bamboo fibre for Sample B has better in mechanical strength than Sample A due to the higher content of lignin which led to the greater density, lower moisture content influenced by higher content of alpha-cellulose and holocellulose. Lastly, top portion revealed that the suitability usage as bio-composite material due to better mechanical strength, lower moisture content and higher density. Nevertheless, both bamboo fibre samples demonstrate the suitability usage as bio-composite materials, even though the mechanical properties are slightly lower but reinforcing the bamboo fibre with plastic composite, thermosetting, epoxy resin and more will enhance its stiffness and strength. This finding will provide as a source for commercial purpose in analysing the capabilities of Buluh Semantan as bio-composite materials in construction sector.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

Building materials and technologies as well construction practices have evolved over times. Construction industry is significant sector of the economy, but it has a huge influence on the environment. Due to the significant influence of the construction industry, the approaches sustainable building has high potential to make an important contribution to sustainable development (Akadiri & Olomolaiye, 2012; Khoshnava et al., 2018). Moreover, most scholars have recognized that the manufacture of building materials has led to an environmental catastrophe (Ishak et al., 2017; Yuan, 2013). Almost 32.2% of carbon dioxide emissions were emitted by the Malaysian building industry in 2010, part of which comes from the cement manufacturing process (Ishak et al., 2017). According to Ishak et al. (2017), the manufacture of green building materials is the first stage in the production cycle of green buildings. A study found out that, the decision of sustainable selection of materials is important to be used in building projects (John et al., 2005). One of the best ways to practice sustainability in construction is through the materials that are being used.

Currently, natural fibre bio-composite has earning enormous interest globally because of the concern for environmental and the benefits of natural fibres over the traditional synthetic fibres used in composites (Das et al., 2020). In September 2006, the Fibre and Bio-composite Centre (FIDEC) was established to lead the production of Malaysia's fibre and bio-composite industries. The main objective of FIDEC is to increase interest in and usage of fibre and bio-composite materials in the country. In addition, bio composite development is an effective way to reduce environmental impacts while maintaining mechanical properties, as well as a cost-effective and environmentally sustainable option (Rodriguez et al., 2020).

Nowadays, the demand for clean environment has increasing which preceded to the use of natural resources for developing innovative green materials (Sair et al., 2019). Consequently, the interest of using natural fibre has risen as reinforcement in composite materials that has various beneficial for instance, renewable and