

Evaluation of *Acacia Mangium* in Structural Size at Green Condition

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Abstract—*Acacia mangium* is one of the most popular choices in the reforestation and rehabilitation of abandoned shifting cultivation areas dated back to the 70's. This paper looks into the evaluation of mechanical strength and physical properties in structural size at green condition for *Acacia mangium*. The mechanical strength properties tests were referred to the modulus of rupture, modulus of elasticity and tensile strength. Meanwhile, physical properties determination referred to basic density and moisture content. At green condition, *Acacia mangium* had been identified under the strength group SG6. It was found that strength value of modulus of rupture was higher than the tensile strength value with 44% stronger in bending compared to in tension. At the structural size, the mean value for moisture content and basic density at green condition were reported with 73.03% and 0.54g/cm³ respectively.

Keywords: Modulus of rupture, modulus of elasticity, tensile strength, basic density and moisture content

I. INTRODUCTION

Acacia mangium (Fabaceae: Mimosoideae) is a perennial tree native to Australia and Asia. Common names for it include Black Wattle, Hickory Wattle and Mangium. The species was selected for this study as a result of some factors. One of the main factors is due to its fast growing characteristics. Besides that, it is also one of the major plantation species in Malaysia. Successful plantations of this species were reported from Sabah [4]. In Sarawak, this species is most widely used in the reforestation and rehabilitation of abandoned shifting cultivation areas [12]. This is because the species is very adaptable to a wide range of soil types that it even thrives on degraded sites where shifting cultivation had been practiced, on hill slopes overgrown with weeds like *Imperata* and *Eupatorium* species, and in areas subjected to seasonal flooding or areas leveled by tractors [21].

Structural usage of the timber is definitely one of the potential areas to explore [4]. A detailed knowledge of the growth and structure of wood is essential to the design of efficient timber structures. Nevertheless, an understanding of its characteristics may help engineer and designer to appreciate the behavior of wood as a constructional material [20]. Consequently, the purpose of this study is to evaluate *Acacia mangium* in structural size at green condition associated to the mechanical strength characteristic.

II. MATERIALS AND METHODS

Materials and sampling methods

A total of 29 *Acacia mangium* trees were collected from Sabal Reforestation Plot. The age of the trees was about 23 years old. From these trees, a total of 323 samples were recovered. From those 323 samples, only the results from 50 samples at green condition were selected randomly and presented. The remaining samples are still in the process of air-drying and will be utilized for further studies.

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