

Mechanical Properties of *Endospermum diadenum* sp. Grown in Sarawak

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Abstract: Timber is a renewable resource and preferred as building and construction material due to physical, mechanical, and has an aesthetically performance. However, timber varies due to its own property and proposes. The quality of the timber has a strong influence on the quality and value of timber products. Therefore, this study will be conducted to learn about mechanical strength properties of Terbulan (*Endospermum diadenum* sp.) fast-growing timber according to BS 373: 1957 Methods of Testing Small Clear Specimens of Timber. Instead of strength property, this study will be determined the suitable utilization of Terbulan timber for the construction industry. The test will be conducted on both conditions which are green and air-dry condition. Generally, Terbulan species is a fast-growing timber in Sarawak. From the point of view, the strength properties parameters such as basic density, modulus of rupture (MOR), modulus of elasticity (MOE) and compressive strength of Terbulan timber will be reviewed to determine the effectiveness of the species in the construction field. As a result of the analysis, it is found that Terbulan timber at the air-dry condition for MOR, MOE and compression parallel to grain reported with 84.17 N/mm², 10217.79 N/mm² and 28.94 N/mm² respectively. Terbulan is categorized in light hardwood timber and conclusion, related products are confined at the beginning it is a steel and concrete replacement that is mostly used in structure such as light construction, furniture and joinery.

Keywords: mechanical properties, fast-grown, strength properties, light hardwood.

I. INTRODUCTION

Wood is a renewable resource and one of the most fascinating materials because of its complex structure and wide application on earth. Solid wood is a preferred building and construction material due to its physical, mechanical, and very aesthetically pleasing performances. However, wood has some drawbacks: its physical and chemical properties readily are changed through environment factors such as light, water, temperature, and biological organisms, which are the main limits for its outdoors and indoors application (Yalinkilic et al. 1999; Caho et al. 2003; Brelid et al. 2000; Deka et al. 2002; Islam et al. 2011). Apart from that, timber is a superior material for building due to its aesthetic, pleasant, warm and friendly effects as well as other advantages, (MTIB, 2009). Moreover, according to Kalinovsky (2010), it stated that timber has the amazing appearance, durability and performance values. It is flexible, reliable and fast to work with. Timber species has its own property and purpose. Their properties vary to each other mostly in their appearance and usage.

II. BACKGROUND

According to Alik (2002), modern technology has made possible for the development of improved grading practices and improved engineered timber products. Destructive test evaluation is one of the techniques that may be useful in grading structural materials, (Alik, 2002). The procedure of destructive testing was adopted according to the British Standard BS 373: 1957, Methods of Testing Small Clear Specimens of Timber. In order to obtain the mechanical properties of this timber, the tests that to be conducted are static bending test and

compression parallel to grain test at Sarawak Forestry laboratory. Furthermore, the study will determine the strength of Terbulan timber for construction industry. The scope of this study also will further discuss the factors affect the mechanical properties of this species of timber.

III. METHODOLOGY

A. Preparation of Material

The samples of Terbulan (*Endospermum diadenum* sp.) are collected from the forest that planted within Unimas campus area. There are 15 logs with the diameter 15-20 cm and 5-7 m long. The ages of the trees are range between 3 – 5 years old. The samples are prepared for two conditions, which are green and air-dry conditions. The drying process is taking almost 2 months to dry. A total of 250 Terbulan samples were used for the tests. All the preparation for small clear specimens is according to Japanese Standard, JIS 2010-1994. The tests involve are static bending test and compression parallel to grain by using the destructive test (DT) method is determined at Sarawak Forestry Corporation. The procedures of the test adopted according to the British Standard BS 373: 1957, Methods of Testing Small Clear Specimens of Timber.

B. Laboratory Work

The specimens are tested by using Universal Testing Machine (UTM) in order to determine the Modulus of Rupture (MOR), Modulus of Elasticity (MOE), maximum loads and maximum compressive strength of specimens.

1. Static Bending Test

The static bending is carried out by the three point bending method. The dimension of a specimen is 20 mm x 20 mm