

# The Behavior of Strength Properties from Three Different Tree Boles of Aras in Sarawak

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**Abstract**—Aras had been selected and tested in small clear specimens. Sampling of test specimens are made from three sections of the tree bole namely from bottom, middle, and top parts. This paper looks into the information of strength properties from three sections of sampled. The strength properties test required are the modulus of rupture, modulus of elasticity and compression stress parallel to grain. Meanwhile, the physical properties' test referred to moisture content and basic density. The testing conducted in two different conditions of the trees, which were referred to green and air-dry condition. It was found that the average mean values for modulus of rupture, modulus of elasticity and compressive stress parallel to grain tested at green condition were  $47.52\text{N/mm}^2$ ,  $6358.56\text{N/mm}^2$  and  $22.42\text{N/mm}^2$  respectively meanwhile at air-dry condition were  $70.49\text{N/mm}^2$ ,  $8217.64\text{N/mm}^2$  and  $34.07\text{N/mm}^2$  respectively. Meanwhile, the average mean values for moisture content at green condition were 83.34% whilst at the air-dry condition were 12.33%. Basic density remains unchanged from both conditions.

**Keywords:** Modulus of rupture, modulus of elasticity, compression stress parallel to grain, moisture content, basic density

## I. INTRODUCTION

Generally, log production in Malaysia is mainly to accommodate the huge demand for general utility timber for industrial purposes. Nowadays, timber industries in Malaysia have involved into cores of plywood and make up the major constituent of fibreboard, particleboard, interior construction wood, and other low grade use. [1]. Sarawak consists of numerous indigenous species of fast growing timber. From these species, there are several which has been identified to be potential species for light wood industries utilisation and for engineering structural design purposes as alternative species. The potential species are referred to Engkabang jantong, Aras, Terbulan, Kelampayan, Sawih, Benuang and, etc. Each of these species has its own characteristics and behaviour whether in terms of physical or strength properties. Therefore, there is a need to get some basic information on its strength and physical properties. Small clear specimens or defect free samples were used to know the strength properties and physical properties distribution within the tree bole viz., from bottom, middle and top parts. For this paper, Aras has been selected for this study.

Aras is a type of tree known by the locals in Sarawak. It is known by its botanical name as *Ilex cissoidea*. In Sabah, this species is known as *bangkulatan* and *morogis*, while in Peninsular Malaysia, this species is known as *timah-timah*. Meanwhile, in Indonesia it is known as *Mensira gunung*. *Ilex cissoidea* is categorized in Aquifoliaceae family that is commonly found throughout the temperate and tropical regions of the world, mainly in South East Asia. Its sapwood is not differentiated from the heartwood, which is white and darkens on exposure to be yellow-brown. The timber is of medium density Light Hardwood, ranging from  $560\text{-}595\text{kg/m}^3$  in air-dry condition. The timber is non-durable and is subject to attacks by sapstain fungi. The grain is straight, and the texture is fine but uneven due to the presence of the broad rays. The split surface has a considerable sheen. This timber is reported to season well with only slight splitting [2]. This genus is rather rare in an occurrence and coupled with its small size. The timber is very unlikely to be of any commercial importance. However, this timber has been tried successfully for match splints and may be a good furniture timber if available in large enough quantities.[2]

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