

STRENGTH PROPERTIES OF YAYA (*Amphimas pterocarpoides*)

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ABSTRACT - This paper presents the results of some strength properties of Yaya (*Amphimas pterocarpoides*), a lesser-known species of Ghana and compares them with those of Odum (*Milicia excelsa*) and European Oak (*Quercus spp.*) which are well known structural timber species in Ghana and Europe respectively. The results showed that at about 12% moisture content the wood has a density of 670kg/m³ with a mean modulus of rupture of 109 N/mm², compressive strength parallel to the grain of 50 N/mm², modulus of elasticity of 11600 N/mm² and shear strength parallel to the grain of 16 N/mm².

The strength properties in the present work suggest that the wood has a potential for utilisation in structural applications.

Keywords - *Amphimas pterocarpoides*, strength properties, structural applications

INTRODUCTION

According to Ghartey (1989), in the almost 82000 km² forest zone representing about 34% of the total area of Ghana, there exist over 420 hardwood species. However only about 50 of these species occur in export statistics for wood in Ghana (TEDB unpubl data). Currently there is not enough technical data on many of the Ghanaian species. The national volume estimates has indicated that several hardwood species are being under-utilised, whilst some primary species such as Odum are over-exploited. (Ghartey 1989)

Yaya (*Amphimas pterocarpoides*) is a lesser-used species which is abundant in the forest. However there is paucity of technical data on its properties and possible areas of utilisation. It is a large tree of up to 39 m high and 2.7 m girth with small or no buttress and clear cylindrical bole. The tree is normally found in the semi-deciduous and evergreen forests of Ghana. According to Irvine (1961), its distribution in Africa ranges from Guinea to Cameroon and it is also found in Congo and Sudan.

This paper presents results of an investigation of some strength properties of the species in order to determine possible areas of

utilisation. It also compares the results with published data on Odum and European oak.

MATERIALS AND METHODS

Wood samples for the investigation was obtained from two trees collected from Akota in the Asenanyo Forest Reserve in the Ashanti Region of Ghana. From each tree, eight planks of dimensions, 55mm x 105mm x 3600mm were taken from the butt, middle and top. These were subsequently stacked under shed and air-dried for one week and later kiln-dried to about 12% moisture content. The planks were then re-sawn and dressed at the wood workshop of the Forestry Research Institute of Ghana into 50mm x 50mm x 315mm strips. Fifty defect free strips were randomly selected from the lot and prepared into 2cm square sections in accordance with American Standard for Testing of Materials (ASTM) (1979) specification D143-52. 30cm, 8cm and 2cm lengths were cut from the strips for the bending, compression and shear tests respectively.

All the specimens were tested in accordance with the ASTM (1979) specification using a 5000kg Universal Testing Machine. The following strength properties were

Table 1: Strength Properties of Yaya

	Moisture Content	Density	Compression parr. to grai	Static Bending		Shear parr. to grain
				MOR	MOE	
	%	Kg/m ³	N/mm ²	N/mm ²	N/mm ²	N/mm ²
Mean	12	670	49.9	108.7	11600	15.8
Var. Co-efficient(%)	-	12	8	11	10	16

determined: modulus of rupture (MOR), modulus of elasticity (MOE), compressive strength parallel to the grain and shear strength parallel to the grain. Moisture content and density were also determined. Twenty specimens were tested for each property.

RESULTS AND DISCUSSIONS

Mean values of the physical and mechanical properties were calculated and are presented in Table 1. The results have also been compared, with published data by Ashiabor (1968) on Odum and European oak at 12% moisture content (Fig 1).

European Oak (690kg/m³). The compressive strength of the three species were not significantly different. (Fig 1).

The bending strength (MOR) of Yaya is about 27% and 19% higher than those of odum and oak respectively. The modulus of elasticity is about 16% higher than odum and 3% higher than Oak. Yaya possesses superior shear strength to Odum and Oak, being about 27% and 30% stronger than Odum and Oak respectively.

CONCLUSION

The results show that the strength properties of yaya compare favourably with those of odum and european oak however it is reported to be non-durable and requires preventive measures for protection against fungal and insect attack before use.

Yaya is widely distributed in the forest zone of Ghana and its strength properties seem to justify its use for structural applications and for general constructional works.

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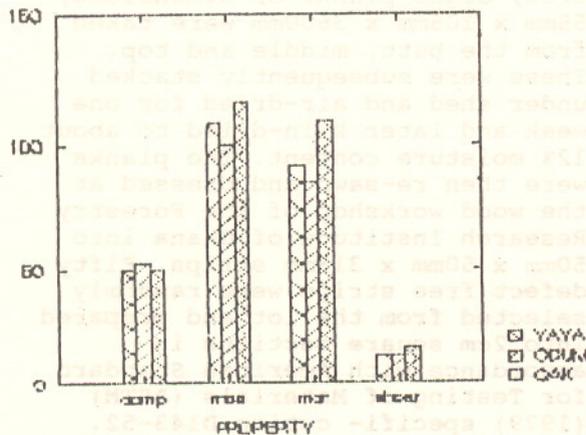


Fig.1 Comparative Strengths of Yaya, Oak and Odum

The results indicate that Yaya is a high density wood. Comparison of Ashiabor's 1968 data and the present results show that the density of Yaya is fairly similar to that of Odum (650kg/m³) and

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