ANATOMICAL PROPERTIES OF AFINA [*Strombosia glaucescens* var *lucida* (J. LEONARD)]

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ABSTRACT - The study was carried out to determine the anatomical properties of Afina (*Strombosia glaucescens*) to assist in the understanding of its physical and mechanical properties.

The results indicate that Afina is a diffuse-porous wood. The parenchyma cells are apotracheal diffuse-in-aggregate. The rays are 2 to 3 cells wide. Afina has an average fibre length of 1.57mm with a Runkel Ratio of 7.54. The wood is hard, with fairly straight grain and the texture is fine. The fibres are thick-walled.

Afina wood being hard, fairly straight grain and of fine texture may be recommended for uses such as tool handles.

Keywords - *Strombosia glaucescens*, anatomical properties, fibre dimensions.

INTRODUCTION

There are about 680 species of trees in the high forests of Ghana of which about 130 grow to timber size. However only about 50 species is of commercial importance now. The remaining species are not utilized significantly because some of them do not occur in commercial quantities (TEDB unpubl. data).

The selection of any species of wood for utilization is determined by properties such as strength, durability, colour, density and figure which are influenced by its anatomical, chemical as well as physical characteristics.

In Ghana, Afina [*Strombosia glaucescens* var. *lucida* (J. Leonard)] is found mostly in the wet and moist evergreen and the moist semi-deciduous formations. Afina is one of the lesser-used species of which there is not enough information. It grows to a height of about 30.5m and an average exploitable girth of 1.22m. (Irvine 1961). The bole which is straight makes it a good promising timber tree, hence the need to study its properties.

The purpose of this study was to determine the anatomical properties of the species with the aim of determining some uses for which this species can be used.

MATERIALS AND METHODS

Five trees of Afina were randomly selected and felled from the Bobiri Forest Reserve, about 30km south- east of Kumasi, in the moist semi-deciduous forest.

Preparation Of Permanent Slides For Description

A block of 10mm x 10mm x 40mm of Afina wood (heartwood) taken from each of the five trees was boiled in water for 48 hours prior to sectioning. Thin sections (15 microns thickness) of cross, longitudinal radial, and longitudinal tangential were cut with a sliding microtome. The thin sections were then stained in safranin and mounted in Canada Balsam for examination and description.

Maceration And Fibre Measurements

To separate wood fibres for measurements, match-stick size of the wood were put into test-tubes containing equal volumes of glacial

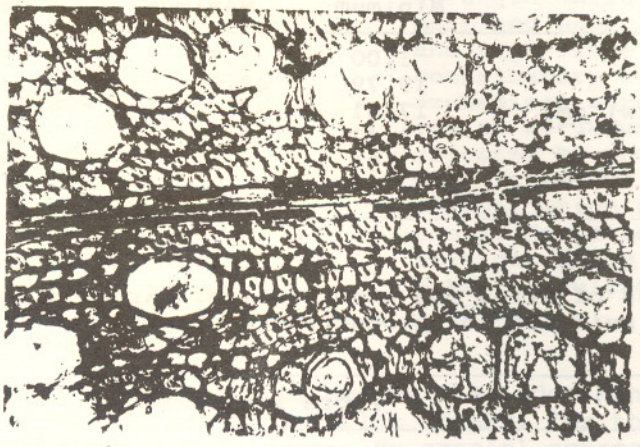

Fig.1a

Fig.1b

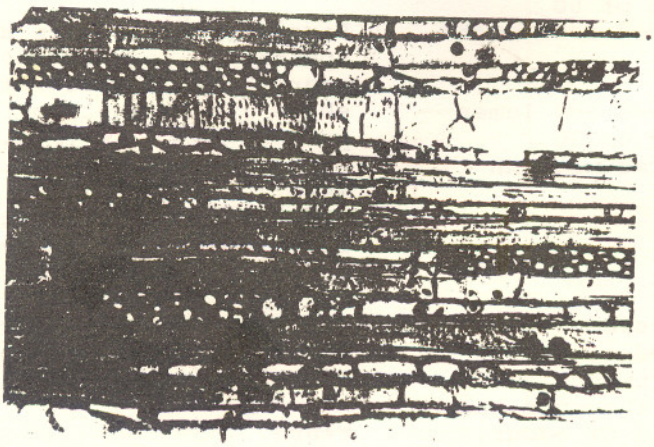

Fig.1c

Table 1: Fibre dimensions of Afina (*Strombosia glaucescens*).

Parameters measured	Minimum	Maximum	Mean
Fibre length mm	1.00	2.50	1.57
Fibre diameter μm	19.79	42.05	27.70
2 x wall-thickness (2w) μm	17.31	37.10	24.19
Lumen width (1) μm	2.47	4.94	3.31
Runkel Ratio $\frac{2w}{L}$	7.01	7.51	7.31

Table 2: Fibre lengths of Afina and some tropical hardwood species found to be suitable for production of paper.

Species	Fibre length (mm)
Strombosia glaucescens (Afina)	1.57
Terminalia ivorensis (Emire)	1.20
Musanga cercropioides (Odwuma)	1.39
Triplochiton scleroxylon (Wawa)	1.30
Pycnanthus angolensis (Otie)	1.40

Source: Anatomy Section of the Forestry Research Institute of Ghana (Unpublished).

acetic acid and hydrogen peroxide (20 vol.), heated in a water-bath at a temperature of 60°C for 48 hours. The resultant macerated wood was then washed under tap-water, teased and mounted for fibre measurements.

The fibre lengths were determined by projecting the fibres on a screen and measuring whole fibres with a paper rule specifically calibrated for this purpose. Measurements were made of 50 randomly selected fibres from each of the five trees.

Diameter, wall-thickness and lumen diameter were measured on 30 randomly selected fibres with an eye-piece micrometer.

RESULTS

The wood is hard as tested with thumb nail. The sapwood is yellowish and the heartwood is pale brown in colour. The wood has no characteristic taste or odour. The grain is fairly straight and the texture fine.

Vessels

In cross section the vessels are oval to circular in shape, moderately numerous and in multiples of 2 to 4. They are diffuse porous, and are radially arranged. Tyloses are present in the vessels (Fig.1a). Crystals of rhomboidal shapes are present in the vessels. The average diameter of vessels is 76.3μm (ranging from 48.5 to 113.2μm). Perforation plates are scalariform.

Parenchyma

Parenchyma cells are abundant, apotracheal and diffuse-in-aggregate. Crystals of rhomboidal shape are present in the parenchyma cells (Fig.1b).

Rays

The rays are heterogeneous type II, non-stored. The average maximum height is 576μm (range 355.7 to 970.1μm) and the average width is 32.01μm (range 24.3 - 48μm). The rays are commonly 2 to 3 cells wide.

Fibre

The fibres are libriform, aseptate and non-stored and overlap with each other. The fibre dimensions are shown in Table 1.
The average fibre length is 1.57mm

with average wall thickness of 24.19μm and Runkel Ratio of 7.31 (Table 1).

DISCUSSION

Afina is a high density wood. Addae-Mensah et al (1989) reported the density to be 896 kgm^3. The high density may be attributed to the thick-walled fibres characteristic of the wood. Compared to some well-known tropical hardwoods suitable for paper production Afina has relatively longer fibre length (Table 2). Although it has a high fibre length its high Runkel Ratio makes it unsuitable for pulp and paper production. Darkwa (1973) reports that thick-walled fibres require high beating for the fibres to develop the necessary strength during the production of pulp and paper. The thick fibres and high fibre lengths are contributory factors for its high mechanical strength. However its use as structural timber is affected by poor working properties due to high crystal content which blunts cutting tools. Nevertheless, its fairly straight grain and fine texture makes it suitable for tool handles.

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