ANATOMICAL PROPERTIES OF LOCALLY GROWN *ACACIA AMPLICEPS* WOOD

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ABSTRACT

Wood structure of *Acacia ampliceps* grown in the country was studied and basic anatomical data was compiled for the assessment of its various technological properties. Permanent slides of cross, radial and tangential sections were prepared by standard laboratory techniques and observed under the microscope for structure, frequency and dimensional measurements of different wood elements/structures in the wood species. Results showed that in *Acacia ampliceps* wood, the fibers are medium in length and reasonably thick-walled. The vessels are small in diameter and lower in frequency. The wood rays are higher in frequency and a bit larger in size. The wood may be better in strength and can be used for various wood products. Preservative treatment of wood before utilization may be required to increase the service life. However, the process of preservation and seasoning of wood may be slow.

INTRODUCTION

Acacia ampliceps Maslin is native to Australia, commonly known as Salt Wattle, Jilla Jilla bush and Nayarlka. It is fast-growing dense shrub or a small tree, 2-8 m high, with a spreading canopy. It can be found on sandy or loamy alluvial soils with an alkaline reaction and is highly tolerant to salinity. The wood is good fuel and good browse (http:// www.fao.org).

The species is fast growing, perennial and can be found on plains, sand dunes and along drainage lines. It can be used for dune stabilization on rocky coastal sites and reclamation of salt affected sites and as a low wind break. It is also tolerant of waterlogged soils. The wood can be used for posts and poles (http://www.ecocrop.fao.org).

In Pakistan, *Acacia ampliceps* was planted under Bio-saline agro-forestry (Biosafor) project. The species grew well under saline environment. Its maximum growth was observed under low to medium salinity patches (Ashraf, et al. 2006). It was rated best at Sahiwal saline site and may be grown to improve the fertility level of saline soils (Shams-ur-Rehman, 2003). To ascertain the quality of wood produced, it is important to investigate its properties so that suitability of the wood species for manufacturing of various forest products can be determined. Thus, by the addition of new wood species, pressure on the commercial timbers can be reduced which are becoming short due to increase in demand to meet the requirements.

This study has been carried out to observe the wood structure of locally grown *Acacia ampliceps* and compile basic anatomical data for the assessment of its various technological properties. Further, the data will also be helpful to determine suitability of the species for wood based products like pulp and paper, fiber board etc.

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MATERIAL AND METHODS

The wood material of *Acacia ampliceps* was collected in log form from Faisalabad. To study the anatomical properties, a disc was cut from end face of the butt log at a height of abut 01 meter. Then the sample blocks were prepared from the disc for sectioning. Permanent slides of cross, radial and tangential sections were prepared by standard laboratory techniques (Anon. 1971) and observed under the microscope for various structural features. Small portion of wood was macerated in a mixture of 20% Nitric acid and Potassium chlorate (Wallis, 1965) to separate the fibers and observe the fiber length. Data were collected for the following microscopic features in the species by the process of micrometery.

- Frequency and diameter of vessels
- Frequency of wood rays (both in cross and tangential section)
- Size (height and width) of wood rays (both in cells and microns)
- Fiber dimensions (length, diameter and wall thickness)

The data collected was analyzed for statistical variables such as mean value, standard deviation and co-efficient of variation for each anatomical feature in the studied species.

RESULTS AND DISCUSSION

General properties of the wood

Sapwood is white to whitish brown, heartwood is yellowish brown to brown with dark streaks, lustrous and produces attractive figure comparable to Shisham. The wood is moderately hard and heavy, straight or somewhat interlocked grained and may be more or less difficult to saw and work. Texture of the wood is medium coarse and may finish to a smooth surface.

Structure of the Wood

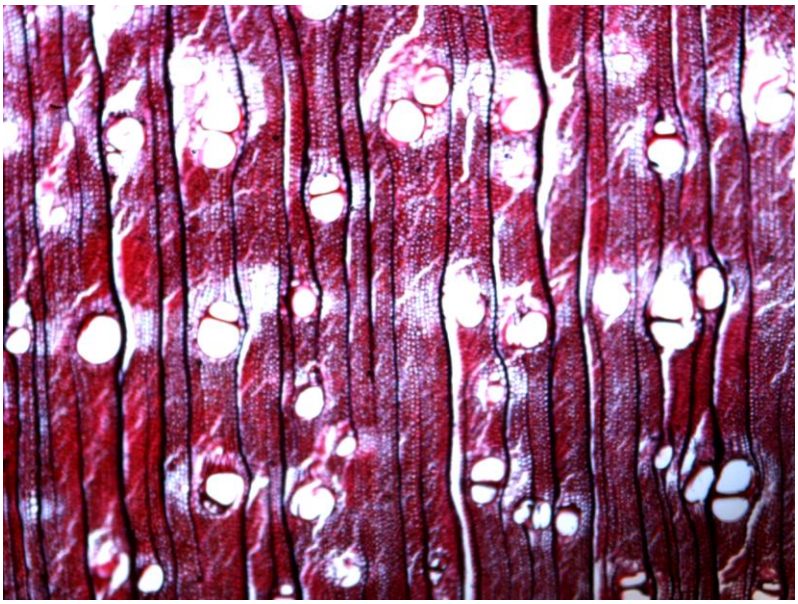
Growth rings are distinct but inconspicuous, not visible without a hand lens, delimited by a narrow sharp line of terminal parenchyma or smaller vessels.

Vessels are circular to oval shaped in out line, mostly occur solitary or paired radially or obliquely, much variable in size, 55µ -280µ in diameter, abundant in middle portion of the ring, 6-10 /mm^2 in number, enclosed in patches of soft tissue (parenchyma) which are confluent or form irregular concentric bands particularly in middle portion of the ring.

Wood rays are fine to medium, undulating and closely spaced in cross section, arranged in alternate fashion and 32-46 /mm^2 in tangential section and are homogeneous. The largest rays are 326µ (37 cells) in height and 35.82µ (3 cells) in width.

Fibers are not definitely arranged in radial rows between the rays, libriform, non

septate, 0.624mm –1.430mm long, 10.20µ- 22.95µ in diameter and have 2.30µ - 4.08µ thick walls.



Photomicrograph showing the wood structure of *Acacia ampliceps*

On the basis of average values as given in table 1, it was observed that in *Acacia ampliceps* wood, the fibers are medium in length and reasonably thick-walled and the wood may by better in strength. The wood rays are higher in frequency and a bit larger in size for the reason the wood may be moderately non-durable and need preservation before utilization to increase the service life. The vessels are smaller in diameter and lower in frequency because of which chemical treatment of the wood may be somewhat difficult. Similarly seasoning process of the wood may also be slow.

Table 1. Frequency and dimensional measurements of different wood elements/ structures in *Acacia ampliceps*

S. No.	Anatomical Feature	Unit	Average value	Standard deviation ±	Co-efficient of variation %
1.	Fiber length	mm	0.977	0.17	18.06
2.	Fiber diameter	µ	16.36	4.04	24.73
3.	Fiber Wall thickness	µ	3.13	0.53	16.91
4.	Fiber lumen width	µ	10.10	-	-
5.	Vessel frequency	/mm^2	8	1.25	16.12
6.	Vessels diameter	µ	104.61	41.02	39.21

S. No.	Anatomical Feature	Unit	Average value	Standard deviation ±	Co-efficient of variation %
7.	Height of ray	µ	210.85	56.25	26.67
8.	Height of ray	cells	18	6.52	36.67
9.	Width of ray	µ	16.77	4.46	26.62
10.	Width of ray	cells	2	0.474	24.64
11.	No. of rays in tangential section	/mm^2	39	4.20	10.64
12.	No. of rays in cross section	/mm	9	-	-

The results are based on single wood specimen and do not cover minor anatomical variations that may occur due to change in locality, growth rate and age of the tree.

CONCLUSION

Acacia ampliceps wood may be better in strength and can be recommended for manufacturing of various wood products. In order to increase the service life, chemical treatment of wood before utilization may be necessary. However, preservation and drying process of the wood may be slow.

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