COMPARISON OF ANATOMICAL PROPERTIES OF MASQUITE (*PROSOPIS JULIFLORA*) WOOD GROWN IN PUNJAB AND SINDH

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ABSTRACT

Wood structure of Masquite (*Prosopis julioflora*) grown in Punjab was studied and the basic anatomical data was compiled to compare with that of grown in Sindh in order to observe variations and find out difference in quality of wood. Permanent slides of cross, radial and tangential sections were prepared and examined under the microscope for various structural features. Data were collected for the frequency and dimensional measurements of various wood elements/ structures in the wood. Results showed that minute variations exist in general in average values of different anatomical features in Masquite wood grown in both areas. In Masquite wood grown in Punjab, the fibers are fairly longer and thick-walled, the wood rays are smaller in size and lower in frequency and the vessels are larger in diameter. The wood may be relatively better in strength, less non-durable and easier to season and preserve than that of grown in Sindh.

INTRODUCTION

Mesquite (*Prosopis julitlora*) probably originates from Peru. It occurs naturally in dry areas of northern South America and Central America, Mexico and southern USA. It has been introduced into many tropical areas, including northeastern Brazil, Africa, Australia, Southeast Asia and the Indian subcontinent. *P. juliflora* has been used to arrest wind erosion and stabilize sand dunes on coastal areas. It is listed as on the tree species used in sand-dune stabilization in India. It is widely planted for land reclamation because it is an aggressive colonizer, tolerant of very poor degraded, saline and alkaline soils. It is also planted in windbreaks and shelterbelts (http://www.Worldagroforestry.org).

Prosopis products have added value it processed, such as by turning firewood to finished timber or into furniture. Larger branches and trunks yield a high quality timber comparable in attributes to Indian rosewood or other commercial hardwoods (http://www.Interface.creative.auckland.ac.nz).

In Pakistan, it is found in the dry plains and hills of Sindh, Punjab, Balochistan, and NWFP. It is an almost evergreen, thorny, shrub or small sized tree grows to a height of 10 m. Yield of 3 to 5m³ has been recorded. The wood is used for fuel, poles and construction, agriculture implements and furniture (Sheikh, 1993).

This study was carried out to examine the structure of Masquite wood grown in Punjab and compile basic anatomical data for comparison with that of grown in Sindh in order to observe variation in different anatomical features and ascertain the difference in quality of wood grown in both areas.

MATERIAL AND METHODS

To conduct the research work, wood material of Masquite wood was collected in log form from Faisalabad and transported to Pakistan Forest Institute, Peshawar. To

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study the anatomical properties, a disc was cut from the end face of butt log at a height of DBH level. Then the sample blocks were removed from the disc and prepared for sectioning by softening. Permanent slides of cross, radial and tangential sections were prepared by standard laboratory procedures (Anon. 1971) and examined under the microscope for various structural features. Small portion of wood was macerated in 20% Nitric acid and Potassium Chlorate (Wallis, 1965) to separate the fibers and observe the fiber length. Data were collected for the frequency and dimensional measurements of different wood elements/ structures by the process of micrometery.

The data collected was analyzed for statistical variables such as mean value, standard deviation and co-efficient of variation for each anatomical feature and compared with the reported values of already studied Masquite wood collected from Sindh.

RESULTS AND DISCUSSION

General characteristics of the wood

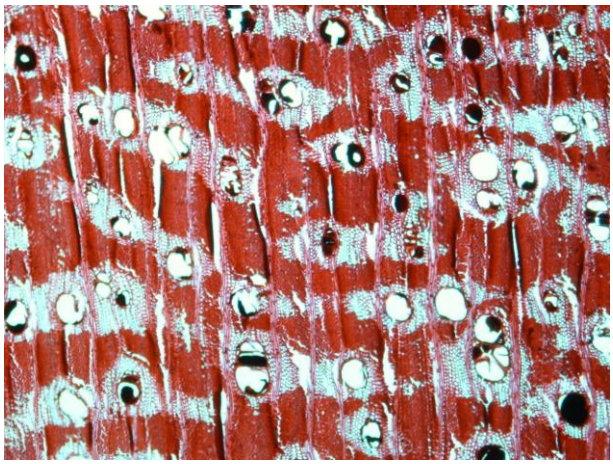
The sapwood is yellow, heartwood is rich brown or dark reddish brown, without any characteristic odor or taste, moderately heavy, spiral grained and medium textured.

Basic structure of the wood

In Masquite wood, the growth rings are distinct delimited by darker band of earlywood and the lighter band of latewood in each growth ring.

The vessels are circular to oval shaped in out line, mostly occur solitary, occasionally in radial rows of 2-3 or paired tangentially and are quite variable in size.

Longitudinal parenchyma is paratracheal, forming complete sheath around the vessels or irregular projections or patches joining the two or three vessels tangentially and obliquely.



Photomicrograph showing the structure of *Prospis juliflora* wood

The wood rays are medium, wavy, placed approximately at equal distance in cross section, much variable in size, arranged in alternate fashion in tangential section and are homogeneous.

The fibers are non-libriform, non-septate, angled in cross section and irregularly arranged between the rays.

Comparison of Anatomical data

Results showed that in Masquite wood grown in Punjab, the fibers are 0.52mm - 1.35mm long, 7.65µ - 17.85µ in diameter and have 2.04µ - 3.32µ thick walls. The vessels are 5 -9 /mm² in number and 48.5µ - 252µ in diameter. The wood rays are 5 – 6 /mm in cross section and 20 – 30 /mm² in tangential section. The largest wood rays are 465µ (50 cells) in height and 61µ (5 cells) in width.

In Masquite wood grown in Sindh, the fibers were reported as 0.41mm - 1.10mm long, 6.86µ - 17.00µ in diameter and 2.02µ - 2.45µ wall thickness. The vessels were 3 - 17 /mm² in number and 57µ - 202µ in diameter. The wood rays were 4-5 /mm in cross section and 17-38 /mm² in tangential section. The largest wood rays were 533µ (41cells) in height and 67µ (5 cells) in width (Nasir, 2008).

Average values of various anatomical features in Masquite wood grown in Punjab and Sindh have been compared in the following table.

Table 1. Comparison of frequency and dimensional measurements of different wood elements/ structures in Masquite wood grown in Punjab and Sindh.

Anatomical features	Masquite wood grown in Punjab (observed values)			Masquite wood grown in Sindh (reported values)
	Average value	Standard deviation ±	Co-efficient of variation %	Average Value
Fiber length (mm)	1.02	0.26	25.70	0.805
Fiber diameter (µ)	12.24	2.79	22.82	11.95
Fiber wall thickness (µ)	2.62	0.31	11.82	2.32
Fiber lumen width (µ)	7.00	-	-	7.31
Number of rays in tangential Section /mm²	24.38	3.15	12.95	26.85
Number of rays in Cross section /mm	5.16	-	-	4.22
Height of ray (µ)	259.96	117.08	45.04	290.99
(cells)	24.62	13.70	55.66	21.92
Width of ray (µ)	37.40	9.06	24.22	51.58
(cells)	3.23	1.27	39.52	3.22
Number of vessels /mm²	6.23	1.06	17.02	8.34
Diameter of vessels (µ)	151.87	53.81	35.43	127.82

On the basis of average values, as given in Table 1, it was observed that minute variations exist in different anatomical features of Masquite wood grown in both areas. However, the fiber length, size of wood rays and vessel diameter vary significantly. In Masquite wood grown in Punjab, the fibers are comparatively longer, wider and thick-walled, the wood rays are smaller in size and lower in frequency per unit area in tangential section while their number per unit distance is somewhat higher in cross section and the vessels are relatively larger in diameter and a bit lower in frequency than that of grown in Sindh.

CONCLUSION

Masquite wood grown in Punjab is comparable in anatomical properties to that of grown in Sindh. However, due to relatively longer and thick-walled fibers, smaller size and lower frequency of wood rays and larger diameter of vessels, the wood may be better in strength, less non-durable and easy to season and preserve than that of grown in Sindh.

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