

A NOTE ON COMPARISON OF WOOD PROPERTIES OF LOCAL AND EUROPEAN ASH WOOD

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Abstract

In order to determine the suitability of local ash wood to be used as substitute of European Ash wood for manufacturing of sports goods, basic anatomical properties of both the wood samples were studied and compared. Results show that local ash wood is comparable to European ash wood with minute variations in frequency and dimensional measurements of different wood elements/ structures. In local ash wood the fiber are comparatively longer, narrow and the vessels are smaller in diameter due to which the wood is somewhat hard and heavy as compared to European ash wood. However, locally grown ash wood is more suitable when the product strength is an important factor.

Introduction

Ash (*Fraxinus excelsior*) wood is one of the valuable European hardwoods. It is widely distributed on the Continent and the timber is exported to UK France and other European countries. In favourable conditions, it grows over 30 meters in height with a clear bole of 9–12 meters and a diameter of 1 meter or more (Randle, 1969).

In Pakistan, ash wood is found natural in the forest areas and cultivated on private lands in the North western hilly regions up to 1,825 m elevation. It is a large to very large tree, attaining a girth up to 3 m and a bole length of 27m. Its supplies are available from Hazara division and Azad Kashmir.

The sapwood is yellowish or grayish white, the heartwood is grayish white to light brown. The wood finishes to an excellent smooth surface and takes a high polish. In general, working qualities are similar to European ash wood (Siddiqui *et al.*, 1996).

The wood is straight grained, and somewhat coarse textured. It is tough and elastic timber and is reasonably durable. It is moderately easy to work, though its uneven texture may cause trouble in surfacing by the machine planer. The wood bends very well and turns satisfactorily (Titmuss, 1965).

Ash wood is one of the best timbers for sports equipment, tool handles, and agricultural implements, and for all purposes where toughness and medium weight are desirable qualities (Dinwoodie, 1981).

The light colour and attractive grain of ash wood make it popular in modern furniture such as chairs, dining tables, doors and other architectural features and [wood flooring](#), although the wood is often popularly stained jet black (http://en.wikipedia.org/wiki/Fraxinus_excelsior).

A study was carried out to examine the general characteristics of both European and local ash wood and collect basic data about the anatomical properties of each sample to examine variations. The main objective of this study was to assess the

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suitability of local ash wood to be used as substitute of European ash wood for manufacturing sports goods.

Materials and Methods

To conduct the research work, the wood samples of local ash wood and European ash wood were collected from the laboratory collection. Permanent slides of cross radial and tangential sections of both the wood samples were prepared by standard laboratory procedures (Anon, 1971) and studied under the microscope for the frequency and dimensional measurements of different wood elements/ structures in each sample. A small portion of wood of each sample was macerated in Schulze's mixture (20% Nitric acid and Potassium Chlorate) to separate the fibers and measure the fiber length in each sample.

The data collected for each microscopic feature were analyzed for descriptive statistics. Photographs of both the local and European ash wood samples and photomicrographs of the cross section of each wood sample were also prepared to show the wood figure and wood structure of each sample.

Results and Discussion

General characteristics of wood

It has been observed that local ash wood resembles in appearance to European ash wood. However, it is slightly dark in colour and open grained than the European ash wood as shown in Fig.1.



Local Ash wood



European Ash wood

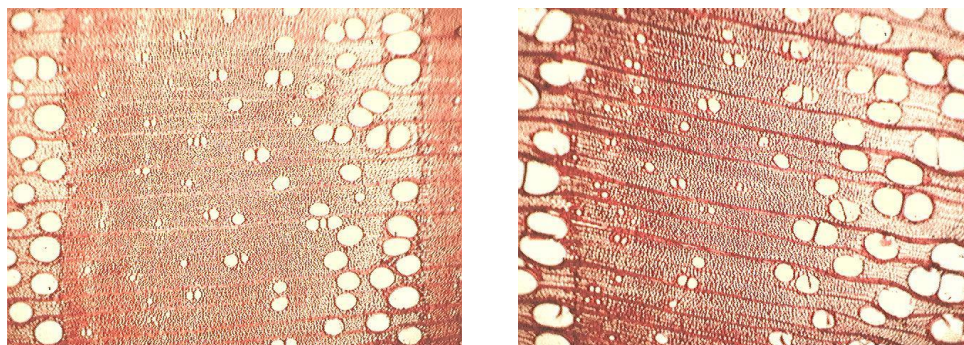
Fig.1. Photographs showing the wood figure in local and European ash wood

Anatomical properties of wood

Local Ash wood

Results showed that in local Ash wood, the frequency of earlywood vessels was 7-12/mm² whereas, the latewood vessels were 8 - 14/mm². The diameter of earlywood

vessels was 99 - 210u whereas the latewood vessels were 23 - 56u wide. The number of wood rays was determined as 6 - 7/mm in cross section and 30 - 42/mm² in tangential section. These were 5 -18 cells (76 - 306u) in height and 2 - 3 cells (19 - 56u) in width. The fibers were 0.962 - 1.69 mm long, 10 - 25u in diameter and their walls were 1.27 - 3.82 u in thickness.



Local Ash wood

European Ash wood

Fig. 2. Photomicrographs showing wood structure of local and European Ash wood

Table.1. Frequency and dimensional measurements of different wood elements/ structures in local and European Ash wood (statistical analysis)

Microscopic feature	Local Ash wood			European Ash wood		
	A.V	S.D±	C.V%	A.V	S.D±	C.V%
Number of vessels /mm ²	E.W 9	1.45	15.98	E.W 9	0.68	7.43
	L.W 10	0.80	17.78	L.W 10	0.67	6.42
Diameter of vessels u	E.W 155	32.0	20.68	E.W 213	69.06	32.4
	L.W 41	8.26	20.17	L.W 62	9.1	30.6
Number of rays in tangential section /mm ²	37	3.18	8.50	33	1.59	4.86
Number of rays in cross section /mm	6	-	-	6	-	-
Height of rays u	197	62.6	31.82	196	64.3	32.83
Height of rays cells	11	3.01	28.20	10	3.10	2.0
Width of rays u	36	11.0	30.59	37	13.9	37.3
	2-3 cells	-	-	2-3	-	-
Fiber length mm	1.29	0.22	17.5	0.955	0.110	11.4
Fiber diameter u	19.02	4.08	21.45	25.70	3.49	13.5
Fiber wall thickness u	2.31	0.68	29.43	3.67	0.63	17.1
Fiber lumen width u	14.4	-	-	18.36	-	-

European Ash wood

In European Ash wood, the number of earlywood vessels was found 8 -10/mm² whereas, the latewood vessels were 9 -11/mm². The diameter of earlywood vessels was 112 - 262u whereas, the latewood vessels were 39 - 92u wide. The frequency of wood rays in cross section was similar (6 - 7mm) to that of in local Ash wood whereas, in tangential section it was 31 - 45/mm². They were 4 -18 cells (97 - 388u) in height and 2 - 3 cells (14 - 58u) in width. The fibers were 0.679 -1.11 mm long, 20 - 33 u in diameter and have a wall thickness of 2.80 - 4.84u.

On comparison of the average values as given in Table 1, it has been observed that frequency of vessels is similar in both the local and European ash wood however, diameter of vessels is smaller in local ash wood due to which void volume in the wood is less and it is comparatively heavier than the European ash wood.

Frequency and size of the wood rays is similar in both the wood samples, which reflect that durability of both the local and European ash wood might be similar.

Length of wood fibers has been found greater in local Ash wood whereas, their diameter and lumen width is smaller due to which percentage of fibers per unit area in local ash wood is higher and it is comparatively harder than the European Ash wood though individual fiber wall thickness is greater in European Ash wood.

Conclusion

Based on the results, it may be concluded that local Ash wood is comparable to European ash wood and can be used for manufacturing of sports goods however, it is somewhat hard and heavy and is more suitable when strength is required in the product.

References

- Anon. 1971. Examination of Timbers, Teaching Aid No. 7. Timber Research and Development Association, Hunghenden Valley, High Wycombe, Bucks.
- Dinwoodie, J. M., 1983. Timber- its structure, properties and utilization. 6th Edition. The Memillan PressLtd. London. pp. 123
- Randle. B. J., 1969 World Timbers, Vol. 1, University of Toronto Press, Ernest Benn Limited, London. pp: 14.
- Siddique, K. M., M. Ayaz and Iqbal Mahmood, 1996. Properties and uses of Pakistani Timbers. Forest Products Research Division, Pakistan Forest Institute, Peshawar. Pakistan. pp.93
- Titmus, F. H., 1965. Commercial Timbers of the World, 3rd Edition, The Technical Press Limited, London. pp.31.
- Wikipedia, the free encyclopedia. (http://en.wikipedia.org/wiki/Fraxinus_excelsior).