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STUDY ON SOME PHYSICAL PROPERTIES OF SOUND AND DISEASE AFFECTED SISSOO (*DALBERGIA SISSOO* ROXB.) WOOD

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Abstract: *Dalbergia sissoo* is an important multipurpose tree species and planted in agroforestry and social forestry practices in Bangladesh. On account of its great strength, elasticity and durability it is valued as good construction and utility timber in Bangladesh. Sapling and trees of 10-15 years old plantation have been dying for unknown diseases since 1996. Shrinkage and specific gravity were studied for sound and disease affected sissoo (*Dalbergia sissoo*) wood at three height positions. Specific gravity was determined on the basis of green and oven-dry volumes. Wood of sound, moderately affected and severely affected trees shows significant difference in respect of tangential and radial shrinkage respectively. Shrinkage and specific gravity were found to be independent of the different height positions.

Key words: *Dalbergia sissoo*; Degraded wood; Wood physics

Introduction

Sissoo is a very important plantation tree species in agroforestry and social forestry practices in Bangladesh, particularly in the north and south-western districts of the country. Over the last 15 to 20 years, extensive plantation of sissoo has been raised in Bangladesh. Government of Bangladesh encouraged people for planting seedlings of sissoo along highways, on embankment, on public and private marginal lands, on canal banks and also as block plantations. Presently people are not interested in planting sissoo because of its massive mortality by unknown disease(s). The main symptoms of this disease are secretion of dark brown ooze from the trunk, wilting of twigs from the tip, yellowing and shedding of leaves, discolouration of wood and huge coppicing from the collar region of the affected tree (Hannan *et al.*, 1999). Since the causal agent of massive mortality has not yet been identified, it is ambiguous whether the disease(s) is/are caused by fungus or insect or the both.

Physical properties are very important in selecting wood for numerous uses, such as musical instruments, decorative surfaces, insulating media etc. (Anon, 1970). Rural Electrification Board (REB) Bangladesh is extensively using this timber species for electric crossarms (REB, 1998) and has been included in REB standard for wood poles, in its revision (REB, 2001). On account of its great strength, elasticity and durability sissoo wood is valued as good construction and utility timber in Bangladesh (Lahiry, 1994a; Lahiry, 1994b; Lahiry, 1997; Satter *et al.*, 1980; Satter, 1981). It is an attempt to study the specific gravity and shrinkage of sound sissoo wood in comparison with wood of affected tree at same and different heights.

Materials and Methods

Dalbergia sissoo wood samples of approximately 10 years of age were collected from Chuadanga district. Samples from top, middle and bottom sections were taken from sound, moderately affected and severely affected trees of the species. Then, the wood samples were cut into 7.5cm discs. At least 3 test specimens (7.5cm X 3.75cm X 2.5cm. Size) were cut from each disc having uniform thickness.

Length of radial and tangential surface was measured using slide caliper. Weight of each test specimen (green) was measured in air using electric balance. In measuring weight of test specimen in water, a small pot containing water was put on the electric balance and its reading was made zero. Then, test piece was immersed into water and reading from electric balance was recorded. Subsequently, test piece of top sections of sound, moderately affected and severely affected samples were placed in an oven. Initially temperature was maintained at 60°C and was raised progressively upto 103⁰ ± 2⁰C. The specimens were kept in the oven till then attained constant weight. The test specimens were then taken from the oven and their length of radial and tangential surfaces as well as weight in air and water were remeasured.

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The same methods were applied for middle and bottom sections of sound, moderately affected and severely affected wood to measure and remeasure their dimension and weight. The shrinkage percentage was calculated by the following formula (Panahin and de-Zeeuw, 1980).

$$\text{Shrinkage \%} = \frac{\text{Green dimension} - \text{Oven dry dimension}}{\text{Green dimension}} \times 100$$

Completely Randomized Design (CRD) was used for statistical analysis.

Results and Discussion

There was a significant difference in radial shrinkage between sound, moderately affected and severely affected trees [calculated value of F (429) is greater than tabulated value of F (5.14) for 2 and 6 degrees of freedom at 5% level of significance. During seasoning shrinkage of *Dalbergia sissoo* wood in radial direction increases with decreasing the degree of degradation of wood (Fig. 1).

Radial shrinkage was the lowest in sound wood and highest in severely affected wood (Fig.1). Again, radial shrinkage didn't differ significantly among top, middle and bottom sections of sound control wood of sissoo trees [calculated value of F (0.263) is less than tabulated value of F (5.14) for 2 and 6 degree of freedom]. Similar results were observed for moderately affected and severely affected wood respectively [In both cases, calculated value is less than tabulated value for 2 and 6 degree freedom at 5% level of significance].

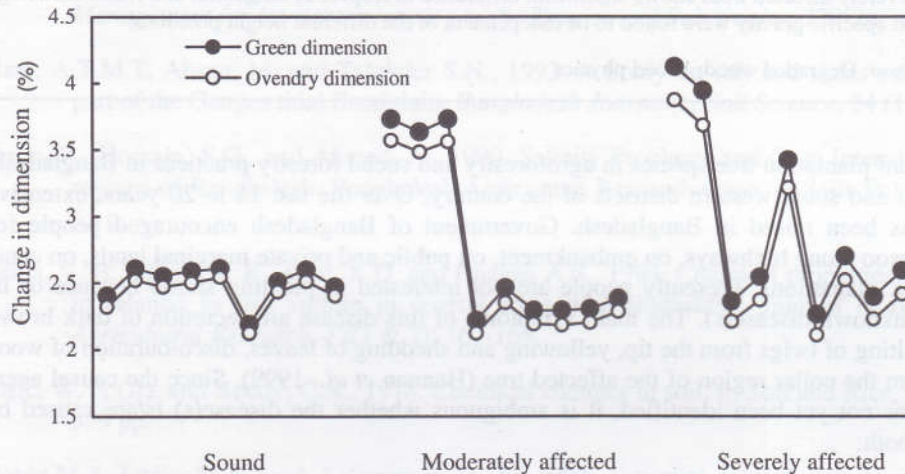


Fig. 1. Shrinkage in radial direction.

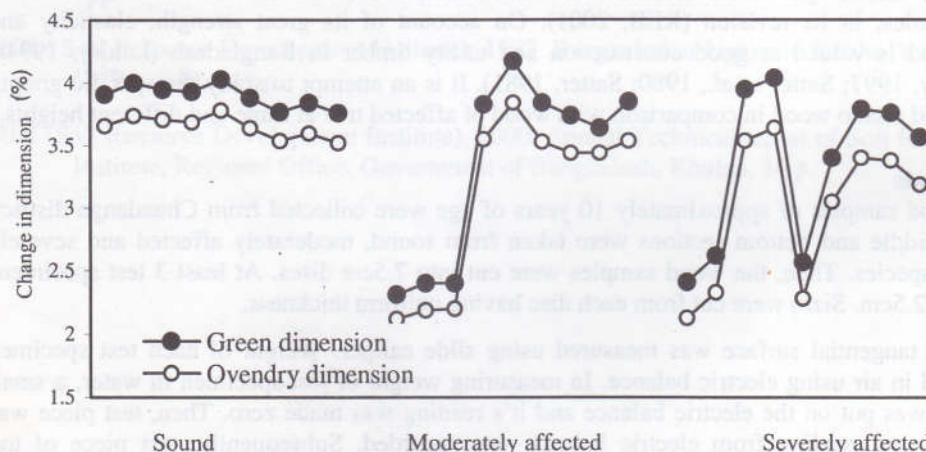


Fig. 2. Shrinkage in tangential direction.

There was no significant difference in tangential shrinkage among top, middle and bottom sections of sound wood of sissoo trees [Calculated value of F (1) is less than tabulated value of F (5.14) for 2 and 6 degree of freedom at 5% level of significance]. Even, no significant differences in tangential shrinkage were found for moderately affected and severely affected trees respectively [In both cases calculated value is less than

tabulated value for 2 and 6 degree of freedom at 5% level of significance]. But there was significant difference in tangential shrinkage among the samples of sound, moderately affected and severely affected trees [Calculated value (176.46) is greater than Tabulated value (5.14) for 2 and 6 degree of freedom at 5% level of significance]. Tangential shrinkage also increases with decreasing the degree of degradation of wood (Fig. 2).

Therefore, samples of sound, moderately affected and severely affected trees show significant difference in respect of tangential and radial shrinkage respectively. But radial shrinkage doesn't differ significantly between top, middle and bottom within the same level of degradation of wood and the same was the case in tangential shrinkage. Therefore, it can be inferred that both radial and tangential shrinkage didn't differ on the position rather differ due to different degree of degradation of wood (sound, moderately affected and severely affected trees). Both tangential and radial shrinkage of sound wood are not very high. Tewari (1994) also found moderate shrinkage of sound wood of sissou. Tangential shrinkage is twice as much as radial shrinkage (Fig. 1 and Fig. 2). Panshin and de- Zeeuw (1980) stated that tangential shrinkage is about twice as great as the radial shrinkage. Specific gravity (Sp.gr.) of the species was also calculated. Sp.gr. of sissou wood decreases with gradual degradation of wood (Table 1).

Table 1. Specific gravity of sound, moderately affected and severely affected sissou wood.

Status of Wood	Height position						Average value	
	Top		Middle		Bottom		Green	Oven dry
	Green	Oven dry	Green	Oven dry	Green	Oven dry		
Sound (control)	0.62	0.71	0.68	0.71	0.60	0.70	0.63	0.70
Moderately affected	0.58	0.61	0.56	0.63	0.59	0.61	0.57	0.61
Severely affected	0.54	0.50	0.50	0.48	0.51	0.48	0.51	0.48

Conclusion

Tangential and radial shrinkage in relation to height position and degree of degradation of wood are very important in service conditions where greater dimensional stability is of primary consideration. It is also revealed that specific gravity increases with the increase of height. Within the same species the less the tangential and radial shrinkage, the better the quality of wood is. Specific gravity of sound wood is higher than that of both moderately affected and severely affected trees of the species.

References

- Anon, 1970. *Indian Forest Utilization*. Volume I, Manager of Publications, New Delhi, pp. 146.
- Hannan, M.O., Roy, A.K. and Hasnin, S.M., 1999. Comparative study on the constituents of sound and disease affected sissou (*Dalbergia sissou* Roxb.) wood. *Khulna University Studies*, 1(2): 139-142.
- Lahiry, A.K., 1994a. Age of tree Vs durability of wood (Theory Vs experience). *Journal of Timber Development Association* (India), XL (2): 20-30.
- Lahiry, A.K., 1994b. Study of density, shrinkage, fibre stress and CCA treatability of ten timber species grown in Bangladesh. *Journal of Timber Development Association* (India), XL (4): 33-39.
- Lahiry, A.K., 1997. CCA treatment groups for hardwood and softwood poles for tropical and subtropical use. *The Malaysian Forester*, 60 (2): 77-83.
- Panshin, A.J. and Zeeuw, C. de., 1980. *Textbook of Wood Technology*. McGraw-Hill Book Company, New York, pp. 202-213.
- REB, 1998. *REB Standard for Wooden Crossarms*. Rural Electrification Board, Dhaka, pp. 24.
- REB, 2001. *REB Standard for Wood Poles*. Rural Electrification Board, Dhaka, pp.46.
- Satter, M.A, 1981. Some physical properties of 116 Bangladeshi timbers. Bull. 7, (Wood Seasoning Series), BFRI, Chittagong, pp.15.
- Satter, M.A., Talukder, Y.A. and Sarker, S.B. 1980. Shrinkage and density studies on twenty one wood species of Bangladesh, Bulletin -5. (Wood Seasoning Series), BFRI, Chittagong, pp.10.
- Tewari, D.N., 1994. *A monograph on Dalbergia sissou* Roxb. Indian Council of Forestry Research and Education. International Book Distributors. 9/3, Rajpur road, Dehradun- 248001, India.