A NOTE ON THE SAPWOOD PERCENTAGE IN SHISHAM (*DALBERGIA SISSOO* ROXB.) IN CHANGA MANGA AND DAPHAR FOREST PLANTATIONS

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Quality products is one of the objectives of forest management. As timber is the major forest produce, therefore it's quality is the main factor in it's economic marketability. Quality of timber from a forest is an interaction of site, silviculture and species.

Shisham is the most important tree species in the irrigated areas in Pakistan. Beside timber it gives substantial quantities of firewood as well. It is also the main forest species in irrigated plantations in Punjab. The local forest department always reports about the difference in the quality of shisham timber from different plantations. For grading of timber into various quality classes, factors like dimensions, freeness from defects and sapwood proportion are taken into consideration. Sapwood in the tree stems is a natural feature and on account of its different colour and lack of resistance towards biological agencies is undesirable. The amount of sapwood in a tree stem is subject to vary with the species, age, height in the tree and growth conditions (Brown, Panshin and Forsaith, 1949), and proportion of sapwood in a log correspondingly affects its utilization and market price.

To see whether there is a difference of sapwood proportion between Changa Manga and Daphar Plantations, observations were recorded on 316 butt logs of shisham from Changa Manga (Comptt. Nos. 11, 12, 156 and 157) and 294 from Daphar (Comptt. Nos. 69, 78, 79 and 114), in the month of January and February, 1985. Quantity of sapwood and heartwood was assessed on the front end of each log. Thickness of heartwood and heartwood + sapwood from the centre of cross-face of the logs was measured along the four radii. Length of each log indicated the height of observation in the tree and each piece was also measured for the D.B.H. of the tree producing it. Area of heartwood and heartwood + sapwood was calculated by the formula πr^2 (r as an average of four radii), assuming that the boundaries of heartwood and sapwood were complete circles. The percentage difference of outer (heartwood + sapwood U. B.) and inner (heartwood) circles in relation to outer circle gave the percentage of sapwood in the log on the basis of cross-sectional area at that point of measurement. The data was grouped according to D.B.H. with 5 cm class interval and averages for sapwood and height of measurement for each D.B.H. class was also calculated (Table I and II). Values in decimals have been rounded of to the nearest full digit. The data was also fed to a computor HP75C, for the calculation of statistical values as cumulative averages of D.B.H., sapwood percentage and height of measurement and standard deviations of these values for each plantation. Coefficient of correlation between D.B.H. and sapwood percentage were also calculated. As D.B.H. and sapwood percentage showed a curvilinear relationship, so simple logarthmic regression analysis was also carried out, as depicted by the following equation.

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$$InY = a + b\ InX$$

Corrected value of Y (sapwood percentage) were plotted against D.B.H. to obtain a smooth curvilinear graphic relationship as shown by Fig. 1.

The average sapwood percentage in shisham from Changa Manga came out to be 40%. for an average D.B.H. of 46 cm and at an average height of 3.84 meters (Table 1). While in Daphar the average sapwood percentage remained as 39% for an average D.B.H. of 45 cm and at an average height of 3.20 meters (Table 2).

Table 1

Sapwood percentage in Shisham in Changa Manga with respect to D.B.H. classes of trees

D. B. H. class cm	No. of trees	Average D. B. H. cm	Average height of measurement m	Average sapwood % (U. B.)
16 – 20	26	18	3.80	71
21 – 25	11	22	3.90	65
26 – 30	28	28	4.00	61
31 – 35	21	33	3.80	51
36 – 40	17	38	3.70	40
41 – 45	33	43	3.70	36
46 – 50	45	48	3.90	32
51 – 55	40	53	3.90	30
56 – 60	44	58	4.10	31
61 – 65	23	62	3.70	30
66 – 70	16	68	3.70	25
71 – 75	9	73	3.60	26
76 – 80	2	78	3.20	38
81 – 85	1	82	2.90	23
Agerage	316	46	3.84	40

Table 2

Sapwood percentage in Shisham in Daphar with respect to D.B.H. classes of trees

D. B. H. class cm	No. of trees	Average D. B. H. cm	Average height of measurement m	Average sapwood % (U. B.)
16 – 20	3	19	2.40	61
21 – 25	33	22	2.60	65
26 – 30	35	28	2.80	58
31 – 35	22	33	3.00	49
36 – 40	24	38	3.00	39
41 – 45	23	43	3.10	34
46 – 50	40	48	3.30	30
51 – 55	33	53	3.40	28
56 – 60	35	58	3.60	25
61 – 65	22	63	3.60	27
66 – 70	19	68	4.00	26
71 – 75	4	73	4.10	23
76 – 80	1	77	2.60	24
Average	294	45	3.20	39

The difference of sapwood percentage between the two localities remained insignificant but by about 1% higher in Changa Manga. Moreover in both the plantations younger trees falling in the D.B.H. class of 16–20 cm sapwood percentage remained much higher as 75% and 61% in Changa Manga and Daphar, respectively. It decreased with a curvilinear trend in higher diameters and came down to 23% in a diameter class of 81–85 cm and 24% in a diameter class of 76–80 cm for Changa Manga and Daphar, respectively. The larger difference between extreme values of sapwood percentage in Changa Manga and Daphar is probably because of less number of trees studied in higher and lower diameter classes.

FIG. 1. GRAPH SHOWING THE RELATIONSHIP BETWEEN D.B.H. AND SAPWOOD PERCENTAGE IN SHISHAM

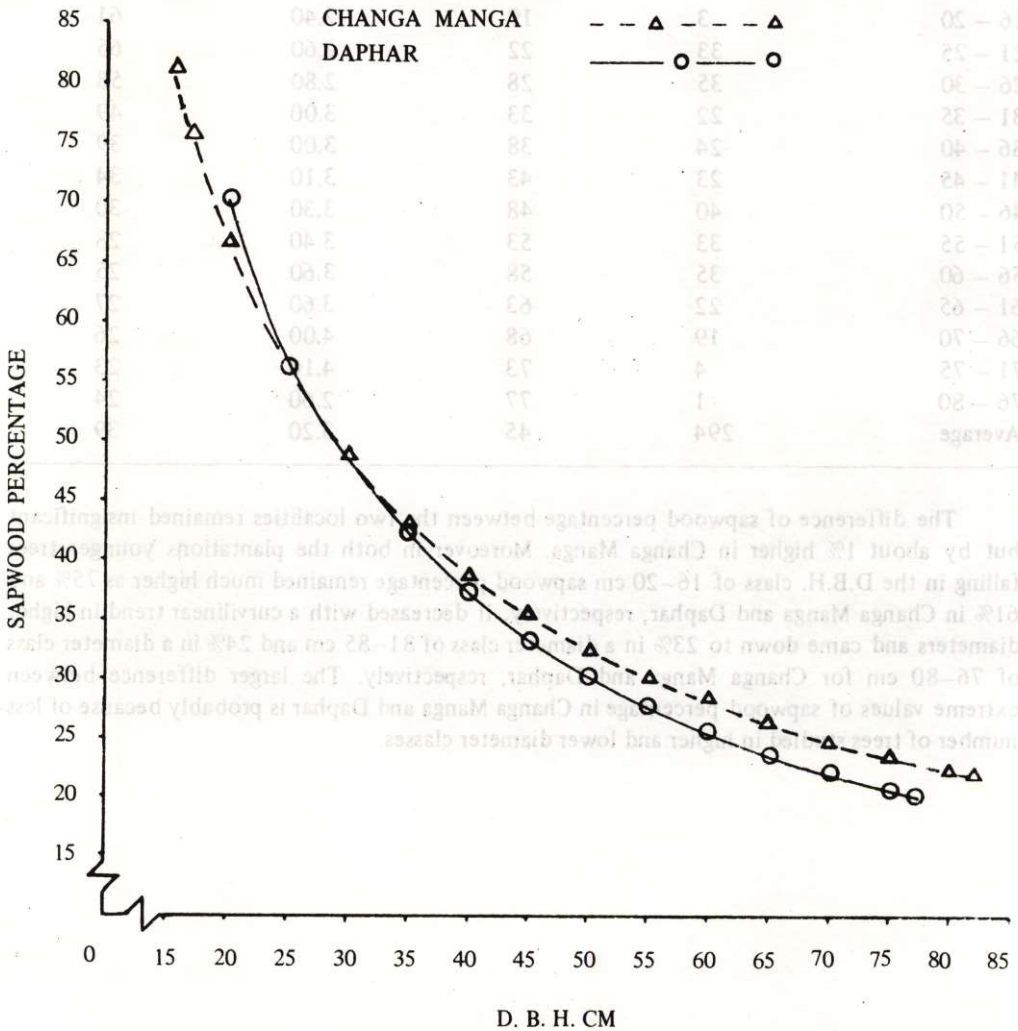

Table 3

Statistical values as standard deviations of D.B.H., sapwood percentage height of measurement and correlation coefficient (x y) in shisham from Changa Manga and Daphar.

Locality	No. of trees	Av. DBH cm (x)	Av. Height of measurement (m)	Av. Sapwood percentage (y)	Correlation (xy)	Remarks
Changa Manga	316	45.9 ± 15.2	3.84 ± 0.53	40.1 ± 17.1	0.4531	Negative and highly significant
Daphar	294	44.8 ± 14.84	3.19 ± 0.63	38.5 ± 16.6	0.4398	Negative and highly significant

The relationship between D.B.H. and sapwood percentage remained curvilinear (Fig. 1), with a very strong but negative correlation coefficient for both the localities (Table 3). At the end it is concluded that the shisham timber from Changa Manga and Daphar is of the same quality so far as the percentage of sapwood in the logs is concerned.