VOLUME TABLES FOR SISSOO, KOROI, MAHOGANY, EUCALYPTUS AND BOKAIN PLANTED ON CROPLANDS IN THE WESTERN PART OF BANGLADESH

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Summary

The Swiss Agency for Development and Cooperation (SDC) is financing raising of trees on croplands and homesteads under Village and Farm Forestry Program (VFFP) since 1987 through different Non-Government Organizations (NGOs) in Bangladesh. This publication presents volume tables for five important species viz. sissoo (*Dalbergia sissoo*), koroi (*Albizia sp.*), mahogany (*Swietenia macrophylla*), eucalyptus (*Eucalyptus camaldulensis*) and bokain (*Melia azadarach*) planted on croplands in the northern and western parts of Bangladesh.

Data collected from plantations raised in the districts of Dinajpur, Bogura, Rajshahi, Natore, Kushtia and Pirojpur were used to generate the volume tables. The trees planted at spacing varied with in 6 m ± 2 m in action research plots as well as farmlands were included to prepare the present volume tables.

We selected representative trees for each species and girth at breast height (gbh) classes at random and measured gbh and total heights of the standing trees. Then we measured the girths at one meter intervals of selected trees by climbing on the trees with a ladder. We also measured the bark thickness to estimate the under bark girth. We gathered data for 698 trees comprising the five species. We computed the volumes of individual sections and estimated the individual tree volume by summing up the volume of all sections of a tree. We related these individual tree volumes (V) to gbh (G) and total height (H) by regression techniques using various functions and transformations as required in the models.

We have chosen equations of the best fit based on highest multiple coefficient of determination, F-ratio and lowest residual mean square. The selected models were also tested with a set of data of 30 trees. The chi-square test of goodness of fit, paired t-test and 45 degree line tests were used to evaluate the soundness of the selected volume equations. The coefficients of determination for selected volume equations are over 0.9. This means that the selected models describe over 90 percent of the total variations. The predicted values tend to make an angle of about 45 degrees. This means that there is no significant difference among the observed and the predicted values. We have selected volume equations to estimate volume from girth at breast height (one-way volume equation/table) and also volume equations to estimate volume from girth at breast height and total height (two-way volume equation/table). We selected models for estimation of the total volume over bark and conversion factors to estimate under bark volume to a top end diameter of approximately 5, 10, 15 and 20 cm under bark from total volume over bark. The volumes upto 20 cm may be used as timber. The volumes upto 10 cm to 15 cm may be used for poles and house posts. The volumes upto 5 cm may be used for small poles.

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LIST OF TABLE

VOLUME TABLES FOR SISSOO, KOROI, MAHOGANY, EUCALYPTUS AND BOKAIN PLANTED ON CROPLANDS IN THE WESTERN PART OF BANGLADESH

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INTRODUCTION:

The Swiss Agency for Development and Cooperation (SDC) is financing raising of trees on croplands and homesteads under Village and Farm Forestry Program (VFFP) since 1987 through different Non-Government Organizations (NGOs) in Bangladesh The initial performance of the program was satisfactory. But sufficient information on growth rates and volume tables of tree species planted on croplands are not available. Therefore, an action research program was designed to generate volume tables and data on growth rates of trees grown on croplands. The present publication presents the volume tables for five important species viz. sissoo (*Dalbergia sissoo*), koroi (*Albizia sp.*), mahogany (*Swietenia macrophylla*), eucalyptus (*Eucalyptus camaldulensis*) and bokain (*Melia azadarach*) planted on croplands in the northern and western parts of Bangladesh.

The plantations have been raised by different NGOs since 1987 in the district of Dinajpur and since 1991 in the districts of Bogura, Kushtia, Natore and Pirojpur. This project covered the plantation located in Dinajpur, Bogura, Kushtia, Natore, Rajshahi and Pirojpur. Seedlings were planted at a spacing of 8 mX 8m in agroforestry action research plots. The farmers have also planted seedlings at different spacing in their farmlands. The spacing varied with in the spacing range of 6 m $\pm$ 2 m. Trees planted in action research plots and farmlands were included to prepare the present volume tables. Data were collected for the study from the month of April 1996 to December 11999.

MATERIALS AND METHODS:

We selected representative trees for each species and girth at breast height (gbh) classes at random and collected data from standing trees. We measured the gbh and total heights of the standing trees first. We hold a bamboo marked at one meter intervals with the selected trees. Then we measured the girths at one meter intervals by climbing on the trees with a ladder. We also took a small sample of barks from each point of girth measurements and measured the bark thickness to estimate the under bark girth. We collected data from a total of 698 trees for preparation of volume tables for sissoo (*Dalbergia sissoo*), koroi (*Albizia sp.*), mahogany (*Swietenia macrophylla*), eucalyptus (*Eucalyptus camaldulensis*) and bokain (*Melia azadarach*) planted on

croplands in Bangladesh. The gbh-height class distributions of the sample trees are given in table 1.

Compilation of data: We computed the volumes of all the sections except top and bottom portions by using the mean cross-sectional areas of the two ends of each section (Smallian formula). We assumed the bottom section cylindrical. Assuming the top section a cone we computed volume as one third of the cylindrical volume of the portion. We considered the top end diameter measurement for each tree as the base diameter of the cone. We ignored the volume of the cone for estimation of under bark tree volume. We estimated the individual tree volume then by summing up the volume of each section of a tree. We related these individual tree volumes (V) to gbh (G) and total height (H) by regression techniques using various functions and transformations as required in the models.

Computation of volume function: We used the multiple regression analysis techniques to select the best suited equations. We tried the following 15 models to select the equation of best fit with different variables as follows.

1. $V = a + bG$
2. $V = a + bG = cG^2$
3. $V = a + bG^2$
4. $V = a + bG^2H$
5. $V = a + bG^2 + cH + dG^2H$
6. $V = a + bG^2 + cGH + dG^2H$
7. $\log(V) = a + b \log(G)$
8. $\log(V) = a + b \log(G) + c \log(H)$
9. $V/G^2 = a + b/G^2 + c/G$
10. $V/G^2 = a + b/G$
11. $V/G^2H = a + b/G^2H$
12. $V/G^2H = a + b/G^2 + cH/G^2 + dH$
13. $V/G^2h = a + b/G^2H + c/H + d/G^2$
14. $V/G^2 = a + b/G^2 + cH/G + dH$
15. $V/G^2H = a + b/G^2H + c/H + d/G$

Where: V= total volume over bark in cubic meters,
G= girth at breast height in centimeters,
H = total height in meters,
b0= the regression constant and
b, c and d are regression coefficients.
The logarithmic functions are to the base e.

We used the following original and transformed variables to select the best suited regression models:

Dependent variables: V, Log (V), V/G^2 and V/G^2H

Independent variables: G, G^2, H^2, G^2H, GH, Log(G), Log(H), $1/G^2$, 1/G, $1/G^2H$, H/G^2, H/G.

The above mentioned dependent variables were regressed with the independent variables.

We have chosen the equations of the best fit based on the highest multiple coefficient of determination, F-ratio and lowest residual mean square. The selected models were also tested with a set of data of 30 trees kept for the purpose. The chi-square test of goodness of fit, paired t-test and 45 degree line tests were used to evaluate the soundness of the selected volume equations. We selected models for estimation of the total volume over book and conversion factors to estimate under bark volume and under bark volume to a top end diameters of approximately 5, 10, 15 and 20 cm under bark from total volume over bark. The volumes upto 20 cm may be used as timber. The volumes upto 10 cm to 15 cm may be used for poles and house posts. The volumes upto 5 cm may be used for small poles.

RESULTS AND DISCUSSIONS

We selected the equations to estimate the total volume over bark (V) and conversion factors to estimate under bark volume and under bark volume to different top end diameters of 5, 10, 15 and 20 centimeters. The coefficients of determination for selected volume equations are over 0.9. This means that the selected models describe over 90 percent of the total variations. The models were verified with the volume of 30 trees for each species with chi-square test of goodness of fit, paired t-test and 45 degree line test. The computed chi-square and t-values are less than the tabular values. The predicted values tend to make an angle of about 45 degrees. This means that there is no significant difference among the observed and the predicted values. The chi-square, t-values and slopes are given below:

Species	Type of model	t-value	chi-square	slope (Degree)
Sissoo	1-way	0.07	0.10	46.1
	2-way	0.36	0.11	44.3
Mahogany	1-way	0.02	0.06	44.0
	2-way	0.12	0.09	44.9
Koroi	1-way	0.82	0.34	40.7
	2-way	0.92	0.34	39.7
Eucalyptus	1-way	0.31	0.38	41.3
	2-way	0.16	0.21	43.5
Bokain	1-way	0.15	0.18	41.9
	2-way	0.15	0.12	41.4

The selected equations of best fit and conversion factors are given in Table 2. We prepared volume tables and conversion factor tables for ready use (Table 3-13).

Confidence limit: These volume tables should not be used to estimate volumes of individual trees in a stand. These tables may be used for the mean tree of a stand that may be multiplied by the number of stem to get the total volume of the stand. Estimation of volumes for the trees much out side the height and gbh ranges shown in the stand table should only be done with caution.

HOW TO USE VOLUME TABLES AND CONVERSION FACTORS:

Take the measurements of girth(s) at breast height and total height(s) of the desired tree(s). Then, choose the corresponding total volume over bark from the volume tables or estimate the total over bark volume by using the volume equation of the selected species first. Then, convert this total over bark volume to under bark volume for desired top end diameter limit by multiplying with the corresponding conversion factor. For example, let the girth and height of a selected mahogany tree are 66 cm and 14 m respectively. Then, the total volume for this mahogany tree is:

$$\log(V) = -12.4361459+1.8661846 \log(G)+1.2282822 \log(H)$$
$$= -12.4361459+1.8661846 \log(\mathbf{66})+1.2282822 \log(\mathbf{14})$$
$$= -1.57096$$

$$V = \text{Exp.}(\log(V)) = 0.2078$$

Multiply this total volume over bark with the corresponding conversion factor to estimate the under bark volume to different top end diameter limits. For examples, under bark volume (Vub) will be estimated as given below:

Vub = V X Fub = 0.2078 X 0.9346 = 0.1943 cum.

Similarly, under bark volume up to top end diameters of 5 cm (girth = 15.7 cm) and 10 cm (girth= 31.4 cm) may be estimated as given below:

V5 = V X F5 = 0.2078 X 0.8437 = 0.1754 cu m.

V10 = V X F10 = 0.2078 X 0.8094 = 0.1682 cu m.

If the measured gbh and total height coincide with the tabular gbh and total height then the tabular values may only be used directly. Other wise, the volumes and conversion factors should be estimated first by using the respective equations followed by estimation of desired volume as given above. The one way volume table (GBH-volume tables and equations) may be used similarly.

The girths have to divide by the factor 2.54 to get inches from centimeters. The height should be multiplied with 3.281 to convert meter into feet. Similarly, volume should be multiplied by the factor 35.32 to get cubic feet from cubic meters. The different top end diameters limit will be used for different uses as per local requirements and management practices.

Table 1. Girth at breast height (GBH) and total height class distribution of the sample trees selected for volume estimation

Species	GBH (cm)	Number of tree in the height class in meters								Total
		5	7	9	11	13	15	17	19	
Sissoo	15	2								2
	25	9	10							19
	35	2	14	1						17
	45		10	14	7					31
	55		7	20	9	2				38
	65			13	13	7	1			34
	75			1	6	3	3			13
	85			3	2	5	1	3		14
	95						3	1		4
	100+						2	2	5	9
	Total	13	41	52	37	17	10	6	5	181
Mahogany	15	1								1
	25	25	7							32
	35	10	23	2		1				36
	45	1	20	2						23
	55	1	3	6						10
	65		2	6	1					9
	75		3	4						7
	85			2						2
	Total	38	58	22	1	1				120
Koroi	25	8	1							9
	35	4	6							10
	45	6	16	3						25
	55	1	17	3						21
	65	1	4	5	1					11
	75		3	3	2					8
	85			2	3	2				7
	90 +			2	7	3				12
	Total	20	47	18	13	5				103
Eucalypts	25	1	1	5	1					8
	35		4	7	3					14
	45			5	9	9	4			27
	55				4	7	1	2	1	15
	65				1	5	8	3	1	18
	75				1	5	4	10	5	25
	85				1		10	5	4	20
	95					1	7	2	4	14
	100+					1	2	1	6	10
	Total	1	5	17	20	28	36	23	21	151
Bokain	25	6								6
	35	5	9	1						15
	45	3	20	9	1					33
	55	4	20	3	4					31
	65	3	8	11	1					23
	75		6	3	4	4				17
	85		3	1	6					10
	90 +				4	3	1			8
	Total	21	66	28	20	7	1			143

Table 2. Volume equations and conversion factors to estimate volume upto different top end diameters for **SISSOO, MAHOGANY, KORAI, EUCALYPTS and BOKAIN** planted on croplands in Bangladesh

Species	Volume equations/Conversion factors	R^2	N
Sissoo	log(V) = -12.14678171+2.49978991*log(G)	0.973	181
	log(V) = -11.8405276+2.07000287*log(G)+0.6152993*log(H)	0.982	
	Fub = G/(11.350332+0.845316*G+0.00115138* G^2)	0.992	181
	F5 = G/(13.777788+1.020588*G+0.00043543* G^2)	0.992	172
	F10 = -0.419849+0.028034*G-0.000157* G^2	0.805	153
	F15 = -1.2178+0.039327*G-0.000195* G^2	0.854	128
	F20 = -1.59817+0.03884*G-0.00016438* G^2	0.830	72
Mahogany	log(V) = -12.045383+2.460647*log(G)	0.979	120
	log(V) = - 11.716535+2.084968*log(G) + 0.534389*log(H)	0.990	
	Fub = G/(11.66204+0.776157G+0.001775*G^2)	0984	120
	F5 = G/(14.45426+0.907825*G+0.000886G^2)	0.974	120
	F10 = - 0.95323+0.051126*G-0.00037* G^2 0.8126 is Constant from gbh 70 cm	0.892	103
	F15= - 1.26594195+0.04436073G-0.00024683*G	0.871	52
	F20 = - 1.53566885+0.04110584*G-0.00019804* G^2	0.836	33
Koroi	log(V) = - 12.093533+2.463398*log(G)	0.931	103
	Log(V) = - 11.961135+1.967741*log(G)+0.907724*log(H)	0.947	
	Fub = G/(13.40213+0.771253*G+0.001486*G^2)	0.987	103
	F5 = G/(16.74442+0.845802*G+0.001185*G^2)	0.974	103
	F10 = 1.08657-28.509926/G	0.844	
	F15 = 1.151096-49.83377/G	0.831	
	F20 = 0.95345+0.019888*G-0.0000573* G^2	0.810	
Eucalypt	log(V)=-11.177929+2.297689 log(G)	0.94	151
	log(V)=-11.523307+1.911628log(G)+0.738982log(H)	0.955	
	Fub = G/(7.6919+0.998172G)	0.982	151
	F5 = G/(10.48456+1.164249G)	0.948	151
	F10 = G/(68.4346+0.191598G+0.0048557G^2)	0.72	115
	F15=-0.63517+0.020269G-0.00007567 G^2)	0.68	97
Bokain	log(V) = - 11.041653 + 2.1705 log(D)	0.935	143
	log(V) = - 10.962743+1.888957 log(D)+0.505435log(H)	0.951	
	Fub = G/(7.16243+0.937244G+0.000353 G^2)	0.988	143
	F5 = G/(10.703146+0.969909G+0.000286G^2)	0.962	143
	F10 = G/(59.67343-0.119535G+0.006555G^2)	0.830	131
	F15=-0.84408+0.034971G-0.000185 G^2	0.788	98

Where: V = total volume over bark in cubic meters, G = girth at breast height in cm, H = total height in meter, Fub = conversion factor to estimate under bark volume from total volume over bark, similarly F5, F10, F15 and F20 are the conversion factors to estimate under bark volumes upto top end diameters of 5, 10, 15 and 20 cm respectively from total volume over bark.

Table 3. One way volume table for **SISSOO**, **MAHOGANY**, **KOROI**, **EUCALYPTS** and **BOKAIN** planted on croplands in Bangladesh

GBH (cm)	Species				
	Sissoo	Mahogany	Koroi	Eucalyptus	Bokain
16	0.0054	0.0054	0.0052	0.0082	0.0066
18	0.0073	0.0072	0.0069	0.0107	0.0085
20	0.0095	0.0093	0.0090	0.0136	0.0107
22	0.0120	0.0118	0.0113	0.0170	0.0131
24	0.0150	0.0146	0.0141	0.0207	0.0158
26	0.0183	0.0178	0.0171	0.0249	0.0188
28	0.0220	0.0214	0.0205	0.0296	0.0221
30	0.0261	0.0253	0.0244	0.0346	0.0257
32	0.0307	0.0297	0.0286	0.0402	0.0296
34	0.0357	0.0344	0.0332	0.0462	0.0337
36	0.0412	0.0397	0.0382	0.0526	0.0382
38	0.0472	0.0453	0.0436	0.0596	0.0429
40	0.0536	0.0514	0.0495	0.0671	0.0480
42	0.0606	0.0579	0.0558	0.0750	0.0534
44	0.0681	0.0650	0.0626	0.0835	0.0590
46	0.0761	0.0725	0.0698	0.0925	0.0650
48	0.0846	0.0805	0.0775	0.1020	0.0713
50	0.0937	0.0890	0.0857	0.1120	0.0779
52	0.1034	0.0980	0.0944	0.1226	0.0848
54	0.1136	0.1075	0.1036	0.1337	0.0921
56	0.1244	0.1176	0.1133	0.1453	0.0996
58	0.1358	0.1282	0.1236	0.1575	0.1075
60	0.1478	0.1394	0.1343	0.1703	0.1157
62	0.1604	0.1511	0.1456	0.1836	0.1242
64	0.1737	0.1634	0.1575	0.1975	0.1331
66	0.1876	0.1762	0.1699	0.2119	0.1423
68	0.2021	0.1896	0.1828	0.2270	0.1518
70	0.2173	0.2037	0.1964	0.2426	0.1617
72	0.2332	0.2183	0.2105	0.2589	0.1719
74	0.2497	0.2335	0.2252	0.2757	0.1824
76	0.2669	0.2493	0.2405	0.2931	0.1933
78	0.2848	0.2658	0.2563	0.3111	0.2045
80	0.3034	0.2829	0.2728	0.3298	0.2160
82	0.3227	0.3006	0.2900	0.3490	0.2279
84	0.3428	0.3190	0.3077	0.3689	0.2401
86	0.3635	0.3380	0.3261	0.3894	0.2527
88	0.3851	0.3576	0.3450	0.4105	0.2656
90	0.4073	0.3780	0.3647	0.4322	0.2789
92	0.4303	0.3990	0.3850	0.4546	0.2925
94	0.4541	0.4207	0.4059	0.4777	0.3065
96	0.4786	0.4430	0.4275	0.5013	0.3208
98	0.5039	0.4661	0.4498	0.5257	0.3355
100	0.5300	0.4898	0.4728	0.5506	0.3506

Table 4. Volumes in cubic meters for **SISSOO** planted on croplands in Bangladesh for height in meters and girth at breast height in centimeter

GBH	Height in meters										
(cm)	5	6	7	8	9	10	11	12	13	14	15
16	0.0060	0.0067	0.0074	0.0081	0.0087	0.0092	0.0098	0.0103	0.0109	0.0114	0.0119
18	0.0077	0.0086	0.0095	0.0103	0.0110	0.0118	0.0125	0.0132	0.0139	0.0145	0.0151
20	0.0096	0.0107	0.0118	0.0128	0.0137	0.0147	0.0155	0.0164	0.0172	0.0180	0.0188
22	0.0117	0.0130	0.0143	0.0156	0.0167	0.0179	0.0189	0.0200	0.0210	0.0220	0.0229
24	0.0140	0.0156	0.0172	0.0186	0.0200	0.0214	0.0227	0.0239	0.0251	0.0263	0.0274
26	0.0165	0.0184	0.0203	0.0220	0.0237	0.0252	0.0268	0.0282	0.0297	0.0310	0.0324
28	0.0192	0.0215	0.0236	0.0256	0.0276	0.0294	0.0312	0.0329	0.0346	0.0362	0.0378
30	0.0222	0.0248	0.0272	0.0296	0.0318	0.0339	0.0360	0.0380	0.0399	0.0417	0.0436
32	0.0253	0.0283	0.0311	0.0338	0.0364	0.0388	0.0411	0.0434	0.0456	0.0477	0.0498
34	0.0287	0.0321	0.0353	0.0383	0.0412	0.0440	0.0466	0.0492	0.0517	0.0541	0.0564
36	0.0323	0.0361	0.0397	0.0431	0.0464	0.0495	0.0525	0.0554	0.0582	0.0609	0.0635
38	0.0361	0.0404	0.0444	0.0483	0.0519	0.0554	0.0587	0.0619	0.0651	0.0681	0.0710
40	0.0402	0.0450	0.0494	0.0537	0.0577	0.0616	0.0653	0.0689	0.0723	0.0757	0.0790
42	0.0445	0.0497	0.0547	0.0594	0.0638	0.0681	0.0722	0.0762	0.0800	0.0838	0.0874
44	0.0489	0.0548	0.0602	0.0654	0.0703	0.0750	0.0795	0.0839	0.0881	0.0922	0.0962
46	0.0537	0.0600	0.0660	0.0717	0.0771	0.0822	0.0872	0.0920	0.0966	0.1011	0.1055
48	0.0586	0.0656	0.0721	0.0783	0.0841	0.0898	0.0952	0.1004	0.1055	0.1104	0.1152
50	0.0638	0.0713	0.0784	0.0852	0.0916	0.0977	0.1036	0.1093	0.1148	0.1202	0.1254
52	0.0692	0.0774	0.0851	0.0924	0.0993	0.1060	0.1124	0.1185	0.1245	0.1303	0.1360
54	0.0748	0.0837	0.0920	0.0999	0.1074	0.1146	0.1215	0.1282	0.1346	0.1409	0.1470
56	0.0806	0.0902	0.0992	0.1077	0.1158	0.1235	0.1310	0.1382	0.1452	0.1519	0.1585
58	0.0867	0.0970	0.1067	0.1158	0.1245	0.1328	0.1409	0.1486	0.1561	0.1634	0.1705
60	0.0930	0.1041	0.1144	0.1242	0.1336	0.1425	0.1511	0.1594	0.1675	0.1753	0.1829
62	0.0996	0.1114	0.1225	0.1329	0.1429	0.1525	0.1617	0.1706	0.1792	0.1876	0.1957
64	0.1063	0.1189	0.1308	0.1420	0.1526	0.1629	0.1727	0.1822	0.1914	0.2003	0.2090
66	0.1133	0.1268	0.1394	0.1513	0.1627	0.1736	0.1841	0.1942	0.2040	0.2135	0.2228
68	0.1205	0.1348	0.1483	0.1610	0.1730	0.1846	0.1958	0.2066	0.2170	0.2271	0.2370
70	0.1280	0.1432	0.1574	0.1709	0.1837	0.1961	0.2079	0.2193	0.2304	0.2412	0.2516
72	0.1357	0.1518	0.1669	0.1812	0.1948	0.2078	0.2204	0.2325	0.2442	0.2556	0.2667
74	0.1436	0.1606	0.1766	0.1917	0.2062	0.2200	0.2332	0.2461	0.2585	0.2706	0.2823
76	0.1517	0.1697	0.1866	0.2026	0.2179	0.2324	0.2465	0.2600	0.2732	0.2859	0.2983
78	0.1601	0.1791	0.1969	0.2138	0.2299	0.2453	0.2601	0.2744	0.2883	0.3017	0.3148
80	0.1687	0.1888	0.2075	0.2253	0.2423	0.2585	0.2741	0.2892	0.3038	0.3179	0.3317
82	0.1776	0.1987	0.2184	0.2371	0.2550	0.2720	0.2885	0.3043	0.3197	0.3346	0.3491
84	0.1867	0.2088	0.2296	0.2493	0.2680	0.2859	0.3032	0.3199	0.3360	0.3517	0.3670
86	0.1960	0.2192	0.2411	0.2617	0.2814	0.3002	0.3184	0.3359	0.3528	0.3693	0.3853
88	0.2055	0.2299	0.2528	0.2745	0.2951	0.3149	0.3339	0.3522	0.3700	0.3873	0.4041
90	0.2153	0.2409	0.2649	0.2875	0.3091	0.3298	0.3498	0.3690	0.3876	0.4057	0.4233

Table 4 Continued.

GBH	Height in meters									
(cm)	11	12	13	14	15	16	17	18	19	20
50	0.1036	0.1093	0.1148	0.1202	0.1254	0.1305	0.1354	0.1403	0.1450	0.1497
52	0.1124	0.1185	0.1245	0.1303	0.1360	0.1415	0.1469	0.1521	0.1573	0.1623
54	0.1215	0.1282	0.1346	0.1409	0.1470	0.1530	0.1588	0.1645	0.1701	0.1755
56	0.1310	0.1382	0.1452	0.1519	0.1585	0.1650	0.1712	0.1774	0.1834	0.1892
58	0.1409	0.1486	0.1561	0.1634	0.1705	0.1774	0.1841	0.1907	0.1972	0.2035
60	0.1511	0.1594	0.1675	0.1753	0.1829	0.1903	0.1975	0.2046	0.2115	0.2183
62	0.1617	0.1706	0.1792	0.1876	0.1957	0.2036	0.2114	0.2190	0.2264	0.2336
64	0.1727	0.1822	0.1914	0.2003	0.2090	0.2175	0.2257	0.2338	0.2417	0.2495
66	0.1841	0.1942	0.2040	0.2135	0.2228	0.2318	0.2406	0.2492	0.2576	0.2659
68	0.1958	0.2066	0.2170	0.2271	0.2370	0.2466	0.2559	0.2651	0.2741	0.2828
70	0.2079	0.2193	0.2304	0.2412	0.2516	0.2618	0.2718	0.2815	0.2910	0.3003
72	0.2204	0.2325	0.2442	0.2556	0.2667	0.2775	0.2881	0.2984	0.3085	0.3184
74	0.2332	0.2461	0.2585	0.2706	0.2823	0.2937	0.3049	0.3158	0.3265	0.3369
76	0.2465	0.2600	0.2732	0.2859	0.2983	0.3104	0.3222	0.3337	0.3450	0.3561
78	0.2601	0.2744	0.2883	0.3017	0.3148	0.3275	0.3400	0.3522	0.3641	0.3757
80	0.2741	0.2892	0.3038	0.3179	0.3317	0.3452	0.3583	0.3711	0.3837	0.3960
82	0.2885	0.3043	0.3197	0.3346	0.3491	0.3633	0.3771	0.3906	0.4038	0.4167
84	0.3032	0.3199	0.3360	0.3517	0.3670	0.3818	0.3964	0.4105	0.4244	0.4380
86	0.3184	0.3359	0.3528	0.3693	0.3853	0.4009	0.4161	0.4310	0.4456	0.4599
88	0.3339	0.3522	0.3700	0.3873	0.4041	0.4204	0.4364	0.4520	0.4673	0.4823
90	0.3498	0.3690	0.3876	0.4057	0.4233	0.4405	0.4572	0.4736	0.4896	0.5053
92	0.3660	0.3862	0.4057	0.4246	0.4430	0.4610	0.4785	0.4956	0.5124	0.5288
94	0.3827	0.4038	0.4241	0.4439	0.4632	0.4819	0.5003	0.5182	0.5357	0.5529
96	0.3998	0.4217	0.4430	0.4637	0.4838	0.5034	0.5225	0.5413	0.5596	0.5775
98	0.4172	0.4401	0.4624	0.4839	0.5049	0.5254	0.5453	0.5649	0.5840	0.6027
100	0.4350	0.4589	0.4821	0.5046	0.5265	0.5478	0.5686	0.5890	0.6089	0.6284

Tables 5. Conversion factors for estimating under bark volume upto different top end diameters for **SISSOO** on croplands in Bangladesh

GBH (cm)	Fub	F5	F10	F15	F20
16	0.6357	0.5295			
18	0.6682	0.5575	0.0339		
20	0.6964	0.5820	0.0780		
22	0.7212	0.6037	0.1209		
24	0.7430	0.6230	0.1625		
26	0.7623	0.6403	0.2029		
28	0.7795	0.6558	0.2420		
30	0.7948	0.6698	0.2799		
32	0.8085	0.6826	0.3165		
34	0.8208	0.6941	0.3518		
36	0.8319	0.7047	0.3859		
38	0.8419	0.7144	0.4187		
40	0.8510	0.7234	0.4503	0.0433	
42	0.8592	0.7316	0.4806	0.0900	
44	0.8666	0.7392	0.5097	0.1351	
46	0.8733	0.7462	0.5375	0.1786	
48	0.8795	0.7527	0.5641	0.2206	
50	0.8850	0.7588	0.5894	0.2610	
52	0.8901	0.7644	0.6134	0.2999	
54	0.8947	0.7697	0.6362	0.3372	0.0199
56	0.8989	0.7746	0.6577	0.3730	0.0614
58	0.9027	0.7792	0.6780	0.4072	0.1016
60	0.9061	0.7835	0.6970	0.4398	0.1405
62	0.9093	0.7875	0.7148	0.4709	0.1780
64	0.9121	0.7913	0.7313	0.5004	0.2143
66	0.9147	0.7949	0.7465	0.5284	0.2492
68	0.9170	0.7982	0.7605	0.5548	0.2829
70	0.9191	0.8014	0.7732	0.5796	0.3152
72	0.9209	0.8043	0.7847	0.6029	0.3462
74	0.9226	0.8071	0.7949	0.6246	0.3758
76	0.9241	0.8097	0.7949	0.6447	0.4042
78	0.9254	0.8122	0.7949	0.6633	0.4313
80	0.9265	0.8146	0.7949	0.6804	0.4570
82	0.9275	0.8168	0.7949	0.6958	0.4814
84	0.9284	0.8189	0.7949	0.7097	0.5045
86	0.9291	0.8209	0.7949	0.7221	0.5263
88	0.9297	0.8227	0.7949	0.7329	0.5468
90	0.9302	0.8245	0.7949	0.7421	0.5660
92	0.9306	0.8262	0.7949	0.7498	0.5838
94	0.9308	0.8278	0.7949	0.7559	0.6003
96	0.9310	0.8293	0.7949	0.7605	0.6155
98	0.9311	0.8307	0.7949	0.7635	0.6294
100	0.9311	0.8320	0.7949	0.7649	0.6420

Table 6. Volumes in cubic meters for **MAHOGANY** planted on croplands in Bangladesh for height in meters and girth at breast height in centimeter

GBH (cm)	Height in meters											
	5	6	7	8	9	10	11	12	13	14	15	16
16	0.0062	0.0069	0.0075	0.0080	0.0086	0.0090	0.0095	0.0100	0.0104	0.0108	0.0112	0.0116
18	0.0080	0.0088	0.0096	0.0103	0.0109	0.0116	0.0122	0.0127	0.0133	0.0138	0.0144	0.0149
20	0.0099	0.0110	0.0119	0.0128	0.0136	0.0144	0.0152	0.0159	0.0166	0.0172	0.0179	0.0185
22	0.0121	0.0134	0.0145	0.0156	0.0166	0.0176	0.0185	0.0194	0.0202	0.0210	0.0218	0.0226
24	0.0145	0.0160	0.0174	0.0187	0.0199	0.0211	0.0222	0.0232	0.0242	0.0252	0.0262	0.0271
26	0.0172	0.0189	0.0206	0.0221	0.0235	0.0249	0.0262	0.0274	0.0286	0.0298	0.0309	0.0320
28	0.0201	0.0221	0.0240	0.0258	0.0275	0.0291	0.0306	0.0320	0.0334	0.0348	0.0361	0.0374
30	0.0232	0.0255	0.0277	0.0298	0.0317	0.0336	0.0353	0.0370	0.0386	0.0402	0.0417	0.0431
32	0.0265	0.0292	0.0317	0.0341	0.0363	0.0384	0.0404	0.0423	0.0442	0.0459	0.0477	0.0493
34	0.0301	0.0332	0.0360	0.0387	0.0412	0.0436	0.0458	0.0480	0.0501	0.0521	0.0541	0.0560
36	0.0339	0.0373	0.0406	0.0436	0.0464	0.0491	0.0516	0.0541	0.0565	0.0587	0.0609	0.0631
38	0.0379	0.0418	0.0454	0.0487	0.0519	0.0549	0.0578	0.0605	0.0632	0.0657	0.0682	0.0706
40	0.0422	0.0465	0.0505	0.0543	0.0578	0.0611	0.0643	0.0674	0.0703	0.0732	0.0759	0.0786
42	0.0467	0.0515	0.0559	0.0601	0.0640	0.0677	0.0712	0.0746	0.0779	0.0810	0.0840	0.0870
44	0.0515	0.0567	0.0616	0.0662	0.0705	0.0746	0.0785	0.0822	0.0858	0.0892	0.0926	0.0958
46	0.0565	0.0623	0.0676	0.0726	0.0773	0.0818	0.0861	0.0902	0.0941	0.0979	0.1016	0.1052
48	0.0617	0.0680	0.0739	0.0793	0.0845	0.0894	0.0941	0.0985	0.1028	0.1070	0.1110	0.1149
50	0.0672	0.0741	0.0804	0.0864	0.0920	0.0973	0.1024	0.1073	0.1120	0.1165	0.1209	0.1251
52	0.0729	0.0804	0.0873	0.0938	0.0998	0.1056	0.1111	0.1164	0.1215	0.1264	0.1312	0.1358
54	0.0789	0.0870	0.0944	0.1014	0.1080	0.1143	0.1202	0.1260	0.1315	0.1368	0.1419	0.1469
56	0.0851	0.0938	0.1019	0.1094	0.1165	0.1233	0.1297	0.1359	0.1418	0.1476	0.1531	0.1585
58	0.0916	0.1009	0.1096	0.1177	0.1254	0.1326	0.1396	0.1462	0.1526	0.1588	0.1647	0.1705
60	0.0983	0.1083	0.1176	0.1263	0.1346	0.1423	0.1498	0.1569	0.1638	0.1704	0.1768	0.1830
62	0.1052	0.1160	0.1260	0.1353	0.1441	0.1524	0.1604	0.1680	0.1754	0.1824	0.1893	0.1959
64	0.1124	0.1239	0.1346	0.1445	0.1539	0.1629	0.1714	0.1795	0.1874	0.1949	0.2023	0.2093
66	0.1199	0.1322	0.1435	0.1541	0.1641	0.1736	0.1827	0.1914	0.1998	0.2078	0.2157	0.2232
68	0.1276	0.1406	0.1527	0.1640	0.1747	0.1848	0.1944	0.2037	0.2126	0.2212	0.2295	0.2376
70	0.1355	0.1494	0.1622	0.1742	0.1856	0.1963	0.2066	0.2164	0.2259	0.2350	0.2438	0.2524
72	0.1437	0.1584	0.1721	0.1848	0.1968	0.2082	0.2191	0.2295	0.2395	0.2492	0.2585	0.2676
74	0.1522	0.1678	0.1822	0.1956	0.2084	0.2204	0.2319	0.2430	0.2536	0.2638	0.2737	0.2834
76	0.1609	0.1774	0.1926	0.2068	0.2203	0.2330	0.2452	0.2569	0.2681	0.2789	0.2894	0.2996
78	0.1698	0.1872	0.2033	0.2183	0.2325	0.2460	0.2588	0.2712	0.2830	0.2944	0.3055	0.3162
80	0.1791	0.1974	0.2143	0.2302	0.2451	0.2593	0.2729	0.2859	0.2984	0.3104	0.3221	0.3334
82	0.1885	0.2078	0.2256	0.2423	0.2581	0.2730	0.2873	0.3010	0.3141	0.3268	0.3391	0.3510
84	0.1982	0.2185	0.2373	0.2548	0.2714	0.2871	0.3021	0.3165	0.3303	0.3436	0.3566	0.3691
86	0.2082	0.2295	0.2492	0.2676	0.2850	0.3015	0.3173	0.3324	0.3469	0.3609	0.3745	0.3876
88	0.2184	0.2408	0.2614	0.2808	0.2990	0.3163	0.3329	0.3487	0.3639	0.3786	0.3929	0.4067
90	0.2289	0.2523	0.2740	0.2942	0.3134	0.3315	0.3488	0.3654	0.3814	0.3968	0.4117	0.4262
92	0.2396	0.2641	0.2868	0.3080	0.3281	0.3471	0.3652	0.3826	0.3993	0.4154	0.4310	0.4461
94	0.2506	0.2763	0.3000	0.3222	0.3431	0.3630	0.3819	0.4001	0.4176	0.4345	0.4508	0.4666
96	0.2619	0.2887	0.3134	0.3366	0.3585	0.3793	0.3991	0.4181	0.4363	0.4540	0.4710	0.4875
98	0.2734	0.3013	0.3272	0.3514	0.3742	0.3959	0.4166	0.4364	0.4555	0.4739	0.4917	0.5090
100	0.2851	0.3143	0.3413	0.3665	0.3903	0.4130	0.4345	0.4552	0.4751	0.4943	0.5129	0.5309

Table 7. Conversion factors to estimate volume upto different top end diameters of **MAHOGANY** planted on croplands in Bangladesh

	Fub	F5	F10	F15	F20
16	0.6521	0.5478			
18	0.6868	0.5791			
20	0.7170	0.6067			
22	0.7433	0.6312			
24	0.7665	0.6530	0.0607		
26	0.7869	0.6726	0.1259		
28	0.8049	0.6902	0.1882		
30	0.8209	0.7061	0.2476		
32	0.8351	0.7205	0.3039		
34	0.8478	0.7336	0.3573		
36	0.8591	0.7456	0.4078	0.0112	
38	0.8692	0.7565	0.4553	0.0633	
40	0.8782	0.7665	0.4998	0.1136	
42	0.8862	0.7757	0.5414	0.1618	
44	0.8934	0.7841	0.5800	0.2081	
46	0.8998	0.7919	0.6156	0.2524	
48	0.9055	0.7991	0.6483	0.2947	
50	0.9106	0.8057	0.6781	0.3350	0.0245
52	0.9151	0.8118	0.7048	0.3734	0.0663
54	0.9191	0.8174	0.7287	0.4098	0.1066
56	0.9227	0.8227	0.7495	0.4442	0.1452
58	0.9258	0.8275	0.7674	0.4766	0.1823
60	0.9285	0.8320	0.7823	0.5071	0.2177
62	0.9308	0.8362	0.7943	0.5356	0.2516
64	0.9329	0.8401	0.8033	0.5621	0.2839
66	0.9346	0.8437	0.8094	0.5867	0.3147
68	0.9360	0.8470	0.8125	0.6092	0.3438
70	0.9372	0.8501	0.8126	0.6298	0.3713
72	0.9381	0.8530	0.8126	0.6485	0.3973
74	0.9389	0.8556	0.8126	0.6651	0.4217
76	0.9394	0.8581	0.8126	0.6798	0.4445
78	0.9397	0.8604	0.8126	0.6925	0.4657
80	0.9399	0.8625	0.8126	0.7032	0.4853
82	0.9399	0.8645	0.8126	0.7120	0.5034

Table 8. Volumes in cubic meters for **KOROI** planted on croplands in Bangladesh for height in meters and girth at breast height in centimeter

GBH	Height in meters										
(cm)	5	6	7	8	9	10	11	12	13	14	15
16	0.0064	0.0076	0.0087	0.0099	0.0110	0.0121	0.0132	0.0143	0.0153	0.0164	0.0175
18	0.0081	0.0096	0.0110	0.0124	0.0139	0.0152	0.0166	0.0180	0.0193	0.0207	0.0220
20	0.0100	0.0118	0.0136	0.0153	0.0170	0.0188	0.0205	0.0221	0.0238	0.0255	0.0271
22	0.0121	0.0142	0.0164	0.0185	0.0206	0.0226	0.0247	0.0267	0.0287	0.0307	0.0327
24	0.0143	0.0169	0.0194	0.0219	0.0244	0.0269	0.0293	0.0317	0.0341	0.0364	0.0388
26	0.0168	0.0198	0.0227	0.0257	0.0286	0.0314	0.0343	0.0371	0.0399	0.0427	0.0454
28	0.0194	0.0229	0.0263	0.0297	0.0330	0.0364	0.0397	0.0429	0.0461	0.0494	0.0525
30	0.0222	0.0262	0.0301	0.0340	0.0379	0.0417	0.0454	0.0492	0.0529	0.0565	0.0602
32	0.0252	0.0297	0.0342	0.0386	0.0430	0.0473	0.0516	0.0558	0.0600	0.0642	0.0683
34	0.0284	0.0335	0.0385	0.0435	0.0484	0.0533	0.0581	0.0629	0.0676	0.0723	0.0770
36	0.0318	0.0375	0.0431	0.0487	0.0542	0.0596	0.0650	0.0704	0.0757	0.0809	0.0862
38	0.0354	0.0417	0.0480	0.0542	0.0603	0.0663	0.0723	0.0783	0.0842	0.0900	0.0958
40	0.0391	0.0461	0.0531	0.0599	0.0667	0.0734	0.0800	0.0866	0.0931	0.0996	0.1060
42	0.0430	0.0508	0.0584	0.0660	0.0734	0.0808	0.0881	0.0953	0.1025	0.1096	0.1167
44	0.0472	0.0557	0.0640	0.0723	0.0804	0.0885	0.0965	0.1044	0.1123	0.1201	0.1279
46	0.0515	0.0608	0.0699	0.0789	0.0878	0.0966	0.1053	0.1140	0.1226	0.1311	0.1396
48	0.0560	0.0661	0.0760	0.0858	0.0955	0.1050	0.1145	0.1239	0.1333	0.1425	0.1518
50	0.0607	0.0716	0.0823	0.0929	0.1034	0.1138	0.1241	0.1343	0.1444	0.1545	0.1645
52	0.0655	0.0773	0.0889	0.1004	0.1117	0.1229	0.1341	0.1451	0.1560	0.1669	0.1776
54	0.0706	0.0833	0.0958	0.1081	0.1203	0.1324	0.1444	0.1563	0.1680	0.1797	0.1913
56	0.0758	0.0895	0.1029	0.1162	0.1293	0.1422	0.1551	0.1679	0.1805	0.1931	0.2055
58	0.0812	0.0959	0.1103	0.1245	0.1385	0.1524	0.1662	0.1799	0.1934	0.2069	0.2202
60	0.0868	0.1025	0.1179	0.1331	0.1481	0.1629	0.1777	0.1923	0.2067	0.2211	0.2354
62	0.0926	0.1093	0.1257	0.1419	0.1579	0.1738	0.1895	0.2051	0.2205	0.2359	0.2511
64	0.0986	0.1164	0.1338	0.1511	0.1681	0.1850	0.2017	0.2183	0.2347	0.2511	0.2673
66	0.1048	0.1236	0.1422	0.1605	0.1786	0.1965	0.2143	0.2319	0.2494	0.2667	0.2840
68	0.1111	0.1311	0.1508	0.1702	0.1894	0.2084	0.2273	0.2459	0.2645	0.2829	0.3012
70	0.1176	0.1388	0.1596	0.1802	0.2005	0.2207	0.2406	0.2604	0.2800	0.2995	0.3188
72	0.1243	0.1467	0.1687	0.1905	0.2120	0.2332	0.2543	0.2752	0.2960	0.3166	0.3370
74	0.1312	0.1548	0.1781	0.2010	0.2237	0.2462	0.2684	0.2905	0.3124	0.3341	0.3557
76	0.1383	0.1632	0.1877	0.2119	0.2358	0.2594	0.2829	0.3061	0.3292	0.3521	0.3749
78	0.1455	0.1717	0.1975	0.2230	0.2481	0.2730	0.2977	0.3222	0.3465	0.3706	0.3945
80	0.1530	0.1805	0.2076	0.2344	0.2608	0.2870	0.3129	0.3386	0.3642	0.3895	0.4147
82	0.1606	0.1895	0.2179	0.2460	0.2738	0.3013	0.3285	0.3555	0.3823	0.4089	0.4353
84	0.1684	0.1987	0.2285	0.2580	0.2871	0.3159	0.3444	0.3728	0.4008	0.4287	0.4565
86	0.1764	0.2081	0.2394	0.2702	0.3007	0.3309	0.3608	0.3904	0.4198	0.4491	0.4781
88	0.1845	0.2177	0.2504	0.2827	0.3146	0.3462	0.3775	0.4085	0.4393	0.4698	0.5002
90	0.1929	0.2276	0.2618	0.2955	0.3288	0.3618	0.3945	0.4270	0.4591	0.4911	0.5228
92	0.2014	0.2376	0.2733	0.3086	0.3434	0.3778	0.4120	0.4458	0.4794	0.5128	0.5459
94	0.2101	0.2479	0.2851	0.3219	0.3582	0.3942	0.4298	0.4651	0.5002	0.5350	0.5695
96	0.2190	0.2584	0.2972	0.3355	0.3734	0.4108	0.4480	0.4848	0.5213	0.5576	0.5936
98	0.2281	0.2691	0.3095	0.3494	0.3888	0.4278	0.4665	0.5048	0.5429	0.5807	0.6182
100	0.2373	0.2800	0.3221	0.3636	0.4046	0.4452	0.4854	0.5253	0.5649	0.6042	0.6433

Table 9. Conversion factors for estimating under bark volume up to different top end diameters for **KOROI** on croplands in Bangladesh

GBH	Conversion factors for estimating under bark volume				
cm	Fub	F5	F10	F15	F20
16	0.6125	0.5232			
18	0.6483	0.5564			
20	0.6798	0.5859			
22	0.7076	0.6124			
24	0.7324	0.6362			
26	0.7545	0.6576			
28	0.7743	0.6770			
30	0.7920	0.6947			
32	0.8080	0.7107	0.1956		
34	0.8224	0.7254	0.2480		
36	0.8354	0.7388	0.2946		
38	0.8472	0.7510	0.3363		
40	0.8578	0.7623	0.3738		
42	0.8675	0.7726	0.4078		
44	0.8762	0.7822	0.4386		
46	0.8842	0.7909	0.4668	0.0678	
48	0.8914	0.7990	0.4926	0.1129	
50	0.8980	0.8065	0.5164	0.1544	
52	0.9039	0.8134	0.5383	0.1928	
54	0.9094	0.8198	0.5586	0.2282	
56	0.9142	0.8256	0.5775	0.2612	
58	0.9187	0.8311	0.5950	0.2919	
60	0.9227	0.8361	0.6114	0.3205	0.0335
62	0.9263	0.8408	0.6267	0.3473	0.0593
64	0.9296	0.8451	0.6411	0.3724	0.0847
66	0.9325	0.8491	0.6546	0.3960	0.1096
68	0.9351	0.8528	0.6673	0.4182	0.1340
70	0.9374	0.8562	0.6793	0.4392	0.1579
72	0.9395	0.8593	0.6906	0.4590	0.1814
74	0.9413	0.8622	0.7013	0.4777	0.2045
76	0.9429	0.8649	0.7114	0.4954	0.2271
78	0.9443	0.8674	0.7211	0.5122	0.2492
80	0.9455	0.8696	0.7302	0.5282	0.2709
82	0.9465	0.8717	0.7389	0.5434	0.2921
84	0.9473	0.8736	0.7472	0.5578	0.3128
86	0.9480	0.8753	0.7551	0.5716	0.3331
88	0.9485	0.8769	0.7626	0.5848	0.3530
90	0.9489	0.8783	0.7698	0.5974	0.3723
92	0.9491	0.8796	0.7767	0.6094	0.3913
94	0.9492	0.8808	0.7833	0.6209	0.4097
96	0.9492	0.8818	0.7896	0.6320	0.4277
98	0.9491	0.8828	0.7957	0.6426	0.4453
100	0.9489	0.8836	0.8015	0.6528	0.4624

Table 10. Volume table for **EUCALYPTUS** planted on croplands in Bangladesh for height in meters and girth at breast height in centimeter

GBH (cm)	Height in meters										
	5	6	7	8	9	10	11	12	13	14	15
16	0.0065	0.0075	0.0084	0.0092	0.0101	0.0109	0.0117	0.0124	0.0132	0.0139	0.0147
18	0.0082	0.0093	0.0105	0.0115	0.0126	0.0136	0.0146	0.0156	0.0165	0.0175	0.0184
20	0.0100	0.0114	0.0128	0.0141	0.0154	0.0167	0.0179	0.0191	0.0202	0.0214	0.0225
22	0.0120	0.0137	0.0154	0.0169	0.0185	0.0200	0.0214	0.0229	0.0243	0.0256	0.0270
24	0.0141	0.0162	0.0181	0.0200	0.0218	0.0236	0.0253	0.0270	0.0287	0.0303	0.0318
26	0.0165	0.0189	0.0211	0.0233	0.0254	0.0275	0.0295	0.0315	0.0334	0.0353	0.0371
28	0.0190	0.0217	0.0243	0.0269	0.0293	0.0317	0.0340	0.0363	0.0385	0.0406	0.0428
30	0.0217	0.0248	0.0278	0.0307	0.0334	0.0362	0.0388	0.0414	0.0439	0.0464	0.0488
32	0.0245	0.0280	0.0314	0.0347	0.0378	0.0409	0.0439	0.0468	0.0497	0.0525	0.0552
34	0.0275	0.0315	0.0353	0.0389	0.0425	0.0459	0.0493	0.0526	0.0558	0.0589	0.0620
36	0.0307	0.0351	0.0394	0.0434	0.0474	0.0512	0.0550	0.0586	0.0622	0.0657	0.0691
38	0.0340	0.0389	0.0436	0.0482	0.0526	0.0568	0.0610	0.0650	0.0690	0.0728	0.0767
40	0.0375	0.0430	0.0481	0.0531	0.0580	0.0627	0.0672	0.0717	0.0761	0.0804	0.0846
42	0.0412	0.0472	0.0529	0.0583	0.0636	0.0688	0.0738	0.0787	0.0835	0.0882	0.0928
44	0.0450	0.0515	0.0578	0.0638	0.0696	0.0752	0.0807	0.0860	0.0913	0.0964	0.1015
46	0.0490	0.0561	0.0629	0.0694	0.0757	0.0819	0.0878	0.0937	0.0994	0.1050	0.1105
48	0.0532	0.0609	0.0682	0.0753	0.0821	0.0888	0.0953	0.1016	0.1078	0.1139	0.1198
50	0.0575	0.0658	0.0738	0.0814	0.0888	0.0960	0.1030	0.1098	0.1165	0.1231	0.1295
52	0.0620	0.0709	0.0795	0.0877	0.0957	0.1035	0.1110	0.1184	0.1256	0.1327	0.1396
54	0.0666	0.0762	0.0854	0.0943	0.1029	0.1112	0.1193	0.1273	0.1350	0.1426	0.1501
56	0.0714	0.0817	0.0916	0.1011	0.1103	0.1192	0.1279	0.1364	0.1447	0.1529	0.1609
58	0.0764	0.0874	0.0980	0.1081	0.1179	0.1275	0.1368	0.1459	0.1548	0.1635	0.1720
60	0.0815	0.0933	0.1045	0.1154	0.1258	0.1360	0.1460	0.1557	0.1651	0.1744	0.1836
62	0.0868	0.0993	0.1113	0.1228	0.1340	0.1448	0.1554	0.1657	0.1758	0.1857	0.1954
64	0.0922	0.1055	0.1182	0.1305	0.1424	0.1539	0.1651	0.1761	0.1868	0.1973	0.2077
66	0.0978	0.1119	0.1254	0.1384	0.1510	0.1632	0.1751	0.1868	0.1981	0.2093	0.2202
68	0.1035	0.1185	0.1328	0.1465	0.1599	0.1728	0.1854	0.1977	0.2098	0.2216	0.2332
70	0.1094	0.1252	0.1403	0.1549	0.1690	0.1826	0.1960	0.2090	0.2217	0.2342	0.2465
72	0.1155	0.1321	0.1481	0.1635	0.1783	0.1928	0.2068	0.2206	0.2340	0.2472	0.2601
74	0.1217	0.1393	0.1561	0.1722	0.1879	0.2031	0.2179	0.2324	0.2466	0.2605	0.2741
76	0.1281	0.1465	0.1642	0.1812	0.1977	0.2137	0.2293	0.2446	0.2595	0.2741	0.2884
78	0.1346	0.1540	0.1726	0.1905	0.2078	0.2246	0.2410	0.2570	0.2727	0.2880	0.3031
80	0.1413	0.1616	0.1811	0.1999	0.2181	0.2358	0.2530	0.2698	0.2862	0.3023	0.3181
82	0.1481	0.1694	0.1899	0.2096	0.2286	0.2472	0.2652	0.2828	0.3000	0.3169	0.3335
84	0.1551	0.1774	0.1988	0.2195	0.2394	0.2588	0.2777	0.2961	0.3142	0.3319	0.3492
86	0.1622	0.1856	0.2080	0.2296	0.2504	0.2707	0.2905	0.3098	0.3286	0.3471	0.3653
88	0.1695	0.1939	0.2173	0.2399	0.2617	0.2829	0.3035	0.3237	0.3434	0.3627	0.3817
90	0.1769	0.2024	0.2269	0.2504	0.2732	0.2953	0.3168	0.3379	0.3585	0.3787	0.3985

Table 10. Continued

GBH	Height in meters										
(cm)	12	13	14	15	16	17	18	19	20	21	22
50	0.1098	0.1165	0.1231	0.1295	0.1359	0.1421	0.1482	0.1543	0.1602	0.1661	0.1719
52	0.1184	0.1256	0.1327	0.1396	0.1464	0.1532	0.1598	0.1663	0.1727	0.1790	0.1853
54	0.1273	0.1350	0.1426	0.1501	0.1574	0.1646	0.1717	0.1787	0.1856	0.1924	0.1992
56	0.1364	0.1447	0.1529	0.1609	0.1687	0.1765	0.1841	0.1916	0.1990	0.2063	0.2135
58	0.1459	0.1548	0.1635	0.1720	0.1804	0.1887	0.1968	0.2049	0.2128	0.2206	0.2283
60	0.1557	0.1651	0.1744	0.1836	0.1925	0.2013	0.2100	0.2186	0.2270	0.2354	0.2436
62	0.1657	0.1758	0.1857	0.1954	0.2050	0.2144	0.2236	0.2327	0.2417	0.2506	0.2594
64	0.1761	0.1868	0.1973	0.2077	0.2178	0.2278	0.2376	0.2473	0.2568	0.2663	0.2756
66	0.1868	0.1981	0.2093	0.2202	0.2310	0.2416	0.2520	0.2623	0.2724	0.2824	0.2923
68	0.1977	0.2098	0.2216	0.2332	0.2446	0.2558	0.2668	0.2777	0.2884	0.2990	0.3095
70	0.2090	0.2217	0.2342	0.2465	0.2585	0.2703	0.2820	0.2935	0.3048	0.3160	0.3271
72	0.2206	0.2340	0.2472	0.2601	0.2728	0.2853	0.2976	0.3097	0.3217	0.3335	0.3452
74	0.2324	0.2466	0.2605	0.2741	0.2875	0.3006	0.3136	0.3264	0.3390	0.3514	0.3637
76	0.2446	0.2595	0.2741	0.2884	0.3025	0.3164	0.3300	0.3435	0.3567	0.3698	0.3828
78	0.2570	0.2727	0.2880	0.3031	0.3179	0.3325	0.3468	0.3610	0.3749	0.3887	0.4023
80	0.2698	0.2862	0.3023	0.3181	0.3337	0.3490	0.3640	0.3789	0.3935	0.4079	0.4222
82	0.2828	0.3000	0.3169	0.3335	0.3498	0.3658	0.3816	0.3972	0.4125	0.4276	0.4426
84	0.2961	0.3142	0.3319	0.3492	0.3663	0.3831	0.3996	0.4159	0.4320	0.4478	0.4635
86	0.3098	0.3286	0.3471	0.3653	0.3831	0.4007	0.4180	0.4350	0.4518	0.4684	0.4848
88	0.3237	0.3434	0.3627	0.3817	0.4004	0.4187	0.4368	0.4546	0.4721	0.4895	0.5066
90	0.3379	0.3585	0.3787	0.3985	0.4179	0.4371	0.4559	0.4745	0.4928	0.5109	0.5288
92	0.3524	0.3739	0.3949	0.4156	0.4359	0.4558	0.4755	0.4949	0.5140	0.5329	0.5515
94	0.3672	0.3895	0.4115	0.4330	0.4542	0.4750	0.4955	0.5156	0.5356	0.5552	0.5747
96	0.3823	0.4055	0.4284	0.4508	0.4728	0.4945	0.5158	0.5368	0.5576	0.5780	0.5983
98	0.3976	0.4219	0.4456	0.4689	0.4918	0.5143	0.5365	0.5584	0.5800	0.6013	0.6223
100	0.4133	0.4385	0.4631	0.4874	0.5112	0.5346	0.5577	0.5804	0.6028	0.6249	0.6468

Table 11. Conversion factors for estimating under bark volume upto different top end diameters for **EUCALYPTUS** on croplands in Bangladesh

GBH (cm)	Fub	F5	F10	F15
16	0.6762	0.5496		
18	0.7015	0.5725	0.2450	
20	0.7232	0.5922	0.2695	
22	0.7419	0.6095	0.2933	
24	0.7583	0.6246	0.3165	
26	0.7728	0.6380	0.3390	
28	0.7856	0.6499	0.3608	
30	0.7971	0.6606	0.3819	
32	0.8074	0.6703	0.4023	
34	0.8167	0.6791	0.4220	
36	0.8252	0.6871	0.4410	
38	0.8329	0.6944	0.4593	
40	0.8400	0.7011	0.4769	0.0512
42	0.8465	0.7073	0.4938	0.0793
44	0.8525	0.7130	0.5101	0.1068
46	0.8581	0.7183	0.5256	0.1337
48	0.8632	0.7232	0.5404	0.1601
50	0.8680	0.7278	0.5546	0.1858
52	0.8725	0.7321	0.5681	0.2109
54	0.8767	0.7362	0.5810	0.2354
56	0.8806	0.7399	0.5933	0.2592
58	0.8843	0.7435	0.6049	0.2825
60	0.8878	0.7468	0.6160	0.3052
62	0.8911	0.7500	0.6264	0.3273
64	0.8942	0.7530	0.6363	0.3488
66	0.8971	0.7558	0.6456	0.3696
68	0.8999	0.7585	0.6544	0.3899
70	0.9025	0.7610	0.6627	0.4095
72	0.9050	0.7634	0.6704	0.4286
74	0.9073	0.7657	0.6777	0.4470
76	0.9096	0.7679	0.6844	0.4649
78	0.9118	0.7700	0.6908	0.4821
80	0.9138	0.7720	0.6967	0.4987
82	0.9158	0.7739	0.7021	0.5147
84	0.9176	0.7758	0.7072	0.5302
86	0.9194	0.7775	0.7118	0.5450
88	0.9212	0.7792	0.7161	0.5592
90	0.9228	0.7808	0.7200	0.5728
92	0.9244	0.7823	0.7235	0.5858
94	0.9259	0.7838	0.7267	0.5981
96	0.9274	0.7853	0.7296	0.6099
98	0.9288	0.7866	0.7322	0.6211
100	0.9302	0.7880	0.7345	0.6317

Table 12. Volume table for **BOKAIN** planted on croplands in Bangladesh for height in meters and girth at breast height in centimeter

GBH	Height in meters										
(cm)	5	6	7	8	9	10	11	12	13	14	15
16	0.0074	0.0081	0.0087	0.0093	0.0099	0.0104	0.0110	0.0115	0.0119	0.0124	0.0128
18	0.0092	0.0101	0.0109	0.0117	0.0124	0.0130	0.0137	0.0143	0.0149	0.0155	0.0160
20	0.0112	0.0123	0.0133	0.0142	0.0151	0.0159	0.0167	0.0175	0.0182	0.0189	0.0195
22	0.0134	0.0147	0.0159	0.0170	0.0181	0.0191	0.0200	0.0209	0.0218	0.0226	0.0234
24	0.0158	0.0174	0.0188	0.0201	0.0213	0.0225	0.0236	0.0246	0.0257	0.0266	0.0276
26	0.0184	0.0202	0.0218	0.0233	0.0248	0.0261	0.0274	0.0287	0.0298	0.0310	0.0321
28	0.0212	0.0232	0.0251	0.0269	0.0285	0.0301	0.0315	0.0330	0.0343	0.0356	0.0369
30	0.0241	0.0265	0.0286	0.0306	0.0325	0.0342	0.0359	0.0376	0.0391	0.0406	0.0420
32	0.0273	0.0299	0.0323	0.0346	0.0367	0.0387	0.0406	0.0424	0.0442	0.0459	0.0475
34	0.0306	0.0335	0.0362	0.0388	0.0411	0.0434	0.0455	0.0476	0.0495	0.0514	0.0532
36	0.0340	0.0373	0.0404	0.0432	0.0458	0.0483	0.0507	0.0530	0.0552	0.0573	0.0593
38	0.0377	0.0413	0.0447	0.0478	0.0507	0.0535	0.0562	0.0587	0.0611	0.0634	0.0657
40	0.0415	0.0455	0.0492	0.0527	0.0559	0.0590	0.0619	0.0647	0.0673	0.0699	0.0724
42	0.0455	0.0499	0.0540	0.0578	0.0613	0.0647	0.0678	0.0709	0.0738	0.0766	0.0794
44	0.0497	0.0545	0.0590	0.0631	0.0669	0.0706	0.0741	0.0774	0.0806	0.0837	0.0867
46	0.0541	0.0593	0.0641	0.0686	0.0728	0.0768	0.0806	0.0842	0.0877	0.0910	0.0942
48	0.0586	0.0643	0.0695	0.0743	0.0789	0.0832	0.0873	0.0912	0.0950	0.0986	0.1021
50	0.0633	0.0694	0.0751	0.0803	0.0852	0.0899	0.0943	0.0986	0.1026	0.1065	0.1103
52	0.0682	0.0748	0.0808	0.0865	0.0918	0.0968	0.1016	0.1061	0.1105	0.1147	0.1188
54	0.0732	0.0803	0.0868	0.0929	0.0986	0.1039	0.1091	0.1140	0.1187	0.1232	0.1276
56	0.0784	0.0860	0.0930	0.0995	0.1056	0.1113	0.1168	0.1221	0.1271	0.1320	0.1367
58	0.0838	0.0919	0.0993	0.1063	0.1128	0.1190	0.1248	0.1304	0.1358	0.1410	0.1460
60	0.0893	0.0980	0.1059	0.1133	0.1203	0.1268	0.1331	0.1391	0.1448	0.1503	0.1557
62	0.0951	0.1042	0.1127	0.1205	0.1279	0.1349	0.1416	0.1480	0.1541	0.1600	0.1656
64	0.1009	0.1107	0.1196	0.1280	0.1358	0.1433	0.1503	0.1571	0.1636	0.1698	0.1759
66	0.1070	0.1173	0.1268	0.1357	0.1440	0.1519	0.1593	0.1665	0.1734	0.1800	0.1864
68	0.1132	0.1241	0.1342	0.1435	0.1523	0.1607	0.1686	0.1762	0.1834	0.1904	0.1972
70	0.1195	0.1311	0.1417	0.1516	0.1609	0.1697	0.1781	0.1861	0.1938	0.2012	0.2083
72	0.1261	0.1383	0.1495	0.1599	0.1697	0.1790	0.1878	0.1963	0.2044	0.2122	0.2197
74	0.1328	0.1456	0.1574	0.1684	0.1787	0.1885	0.1978	0.2067	0.2152	0.2234	0.2314
76	0.1396	0.1531	0.1655	0.1771	0.1879	0.1982	0.2080	0.2174	0.2263	0.2350	0.2433
78	0.1467	0.1608	0.1738	0.1860	0.1974	0.2082	0.2185	0.2283	0.2377	0.2468	0.2555
80	0.1538	0.1687	0.1824	0.1951	0.2071	0.2184	0.2292	0.2395	0.2494	0.2589	0.2681
82	0.1612	0.1767	0.1911	0.2044	0.2170	0.2288	0.2401	0.2509	0.2613	0.2712	0.2809
84	0.1687	0.1850	0.2000	0.2139	0.2271	0.2395	0.2513	0.2626	0.2734	0.2839	0.2939
86	0.1764	0.1934	0.2091	0.2237	0.2374	0.2504	0.2627	0.2745	0.2859	0.2968	0.3073
88	0.1842	0.2020	0.2183	0.2336	0.2479	0.2615	0.2744	0.2867	0.2985	0.3099	0.3209
90	0.1922	0.2107	0.2278	0.2437	0.2587	0.2728	0.2863	0.2991	0.3115	0.3234	0.3349
92	0.2003	0.2197	0.2375	0.2540	0.2696	0.2844	0.2984	0.3118	0.3247	0.3371	0.3491
94	0.2086	0.2288	0.2473	0.2646	0.2808	0.2962	0.3108	0.3248	0.3382	0.3511	0.3635
96	0.2171	0.2381	0.2573	0.2753	0.2922	0.3082	0.3234	0.3379	0.3519	0.3653	0.3783
98	0.2257	0.2475	0.2676	0.2862	0.3038	0.3204	0.3362	0.3513	0.3659	0.3798	0.3933
100	0.2345	0.2571	0.2780	0.2974	0.3156	0.3329	0.3493	0.3650	0.3801	0.3946	0.4086

Table 13. Conversion factors for estimating under bark volume upto different top end diameters for **BOKAIN** on croplands in Bangladesh

GBH(cm)	Fub	F5	F10	F15
16	0.7188	0.6084	0.2691	
18	0.7450	0.6370	0.3017	
20	0.7673	0.6618	0.3338	
22	0.7864	0.6835	0.3652	
24	0.8031	0.7027	0.3960	
26	0.8176	0.7198	0.4260	
28	0.8304	0.7350	0.4553	
30	0.8418	0.7487	0.4836	
32	0.8519	0.7611	0.5111	
34	0.8610	0.7723	0.5376	
36	0.8691	0.7825	0.5632	
38	0.8765	0.7918	0.5877	0.2177
40	0.8832	0.8003	0.6111	0.2588
42	0.8893	0.8082	0.6335	0.2984
44	0.8948	0.8154	0.6548	0.3365
46	0.8998	0.8221	0.6751	0.3731
48	0.9045	0.8283	0.6942	0.4083
50	0.9087	0.8341	0.7123	0.4420
52	0.9126	0.8394	0.7293	0.4742
54	0.9162	0.8444	0.7452	0.5049
56	0.9195	0.8490	0.7601	0.5341
58	0.9226	0.8534	0.7739	0.5619
60	0.9254	0.8574	0.7867	0.5882
62	0.9281	0.8612	0.7986	0.6130
64	0.9305	0.8648	0.8095	0.6363
66	0.9327	0.8682	0.8195	0.6581
68	0.9348	0.8713	0.8286	0.6785
70	0.9368	0.8743	0.8368	0.6974
72	0.9385	0.8771	0.8442	0.7148
74	0.9402	0.8797	0.8508	0.7307
76	0.9418	0.8822	0.8567	0.7452
78	0.9432	0.8845	0.8618	0.7581
80	0.9445	0.8868	0.8662	0.7696
82	0.9458	0.8889	0.8700	0.7796
84	0.9469	0.8909	0.8731	0.7881
86	0.9480	0.8927	0.8757	0.7952
88	0.9490	0.8945	0.8776	0.8007
90	0.9499	0.8962	0.8791	0.8048
92	0.9507	0.8978	0.8800	0.8074
94	0.9515	0.8993	0.8805	0.8085
96	0.9522	0.9007	0.8805	0.8082
98	0.9528	0.9021	0.8801	0.8063
100	0.9534	0.9034	0.8793	0.8030