VOLUME TABLES FOR 11 IMPORTANT TREE SPECIES GROWN IN THE HOME GARDENS OF BANGLADESH

M. A. LATIF

S.M. ZAHIRUL ISLAM

FOREST INVENTORY DIVISION

BANGLADESH FOREST RESEARCH INSTITUTE
CHITTAGONG
P. O. Box-273, Chittagong 4000, Bangladesh.
2000

Volume Tables For 11 Important Tree Species Grown In The Home Gardens Of Bangladesh

M. A. Latif and S.M. Zahirul Islam
Divisional Officer, Bangladesh Forest Research Institute
Post Box-273, Chittagong 4000, Bangladesh

Introduction

The climatic conditions of Bangladesh are not uniform through out the whole country. Therefore, the species composition and growth rates of different species growing in the home gardens at different parts of Bangladesh are not the same. At the same time volume tables and growth rates for these species growing in the different areas are not known. A village forest inventory was carried out in 1980-81 by FAO/UNDP (Hamermaster 1981) and re-measurement was taken in 1984 (Renes *et.al* 1984). Volume tables (Latif *et. al.* 1999) and growth and yield tables (Latif 1999) of 5 important species planted on croplands in the western parts of Bangladesh have been prepared. Volume tables and estimation of growth rates for the important species are essential to know the stocking and its management. Therefore, the present study has been under taken with the financial assistance of the World Bank under Agricultural Research Management Project organised by the Bangladesh Agricultural Research Council.

Materials And Methods

Hamermaster (1981) divided Bangladesh into 6 echo-geographical regions. He excluded Chittagong district from his classification. Chittagong has been included in the present study. Thus there were 7 echo-geographical regions. A multistage random sampling method was applied to locate representative villages for the study. Sampling was done at four levels: district, Thana, village and individual fAmmmily. Districts were selected followed by selection of Thana, villages and individual family at random from each zone. Then representative trees of the selected family were chosen at random.

We selected representative trees for each species and girth at breast height (gbh) classes at random for preparation of volume tables. First, we measured the gbh and total heights of the standing trees. Then we measured the girths of the tree at one meter intervals from at about 30 cm above ground level. We removed a small sample of bark from each point of girth measurements and measured the bark thickness to estimate the under bark girth. We measured the girths at one meter

intervals and bark thickness by climbing on the trees with ladders. We collected data of 1227 trees for preparation of volume tables for the 11 important species. The dbh class distributions of the sample trees are given in table 1.

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

Computation of volume function: We did multiple regression analyses 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. $\ln(V) = a + b \ln(G)$
8. $\ln(V) = a + b \ln(G) + c \ln(H)$
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. $V/G^2H = a + b/G^2 + cH/G^2 + GH$
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 cm,

H = total height in meters

b_0 is the regression constant and b, c and d are regression coefficients.

The logarithmic functions are to the base e.

We have chosen the equations of the best fit based on the highest multiple coefficient of determination, F-ratio and lowest residual mean square. We have selected models for estimation of the total volume over bark and conversion factors to estimate under bark volume and under bark volumes to top end diameters of approximately 5, 10, 15 and 20 cm over bark.

Results And Discussions

We have selected volume equations for estimation of total volume over bark for 11 important species. The species are: Ama, Badi, Jam, Kanthal, Koroi, Mahogany, Neem, Pitraj, Rain tree, shimul and KadAm. We have selected conversion factors to estimate under bark volume and under bark volumes to top end diameter of approximately 5,10,15 an 20 cm over bark. The selected volume equations and conversion factors are given in Table 2.

We have estimated volumes and conversion factors for ready use and are presented in Table 3-23. The volume equations and tables are applicable for the 11 species growing in the home gardens of seven echo-geographical regions of Bangladesh.

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 which 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) first to have an estimate of the volume. 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 and convert this total over bark volume to under bark volume for desired top end diameter limit. For example, let the girth and height of the selected **Amm** tree are 66 cm and 14 m respectively. Then, the total volume for this mahogany tree is:

log (V) = -11.25377+1.96697×log(G)+0.52237×log (H)

= -11.25377+1.96697×log(66)+0.52237×log (14)

= -1.63428

V = Exp.(log(V)) = 0.19509

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 (V_{ub}) will be estimated as given below:

$V_{ub} = V \times F_{ub} = 0.19509 \times 0.909 = 0.177$ 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:

$V_5 = V \times F_5 = 0.19509 \times 0.804 = 0.157$ cu m.

$V_{10} = V \times F_{10} = 0.19509 \times 0.712 = 0.139$ 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 tables (GBH-volume tables and equations) may similarly be used.

Table 1. Girth at breast height (gbh) class distribution of sample trees measured for volume estimation for the important tree species grown in the home gardens of the seven Echo-agrogeographical zones of Bangladesh

	GBH Class													
Species	<15.0	15.1-30.0	30.1-45.0	45.1-60.0	60.1-75.0	75.1-90.0	90.1-105.0	105.1-120.0	120.1-135.0	135.1-150.0	150.1-165.0	165.1-180.0	180.0+	Total
Amm	7	49	54	65	57	35	29	20	15	8	3	2	4	348
Kanthal	4	19	23	20	21	14	4	7	2	1	1	3	1	120
Rain tree	5	14	15	14	18	14	16	18	17	5	5	3	10	154
Korai	3	20	25	19	20	16	20	6	7	3	2			141
Mahogany	8	25	25	16	11	6	6	4	2	1	1			105
Jam	2	10	21	18	20	11	8	2	4	2				98
Pitraj	5	29	24	12	13	12	4	2	4			1		106
Badi		15	15	24	15	8	10							87
Kadam		3	4	2	1	3	1							14
Neem		5	8	9	7	5	2							36
Shimul	4		2	5	3	2	2							18
Total	38	189	216	204	186	126	102	79	51	20	12	9	15	1227

Table 2. Volume and conversion factor equations selected to estimate total volume and under bark volumes to different top end diameters for 11 important species of home gardens of Bangladesh

Species	Selected Model	N	R^2
Amm	$\log(V_t) = -11.27269 + 2.24506\times\log(G)$	343	0.975
	$\log(V_t) = -11.25377 + 1.96697\times\log(G) + 0.52237\times\log(H)$	343	0.981
	$F_{ub} = G/ (5.17418 + 0.00747\times G)$	342	0.991
	$F_5 = 0.93459 - 8.61513/ G$	339	0.635
	$F_{10} = 0.98017 - 17.68901/ G$	312	0.781
	$F_{15} = -0.38336 + 0.01709\times G - 0.00005\times G^2$	262	0.858
	$F_{20} = -0.21340 + 0.00747\times G$	208	0.789
Badi	$\log(V_t) = -11.519102 + 2.01724\times\log(G) + 0.56356\times\log(H)$	87	0.971
	$F_{ub} = G/ (5.42321 - 0.00020\times G + 1.06073\times G^2)$	87	0.984
	$F_5 = G/ (11.61961 + 1.17583\times G + 0.00015\times G^2)$	87	0.943

Species	Selected Model	N	R^2
	F_{10} = -0.5897 + 0.03195G-0.00018G^2 0.709 is constant from gbh 63 cm	80	0.856
	F_{15} = - 0.26776 + 0.01039×G 0.667 is constant from gbh 90 cm	63	0.820
	F_{20} = -0.01928 - 0.00269*G + 0.00009×G^2 0.643 is constant from gbh 102 cm	42	0.835
Jam	$\log(V_t)$ = -11.24854 + 2.24804×log(G)	99	0.966
	$\log(V_t)$ = -11.10705 + 2.32592×log(G) + 0.8952×log(H)	99	0.966
	F_{ub} = G/ (4.68356 + 1.02669×G)	97	0.994
	F_5 = G/ (14.01780 + 1.05539×G)	97	0.937
	F_{10} = 0.02585 + 0.01522×G - 0.00007×G^2 0.774 is constant from gbh 75 cm	90	0.650
	F_{15} = - 0.58716 + 0.02363×G - 0.00010×G^2 0.712 is constant from gbh 87 cm	79	0.754
	F_{20} = -1.07185 + 0.02794×G - 0.00010×G^2 0.633 is constant from gbh 90 cm	61	0.798
Kadam	$\log(V_t)$ = -11.63629 + 2..32592×log (H)	14	0.983
	$\log(V_t)$ = -11.12693 + 1.83260×log (G) + 0.68015×log (H)	14	0.993
	F_{ub} = G/ (6.16218 + 0.99459×G)	14	0.991
	F_5 = G/ (3.19902 + 1.02381×G	14	0.981
	F_{10} = - 0.72032 + 0.03824×G - 0.00023×G^2 0.771 is constant from gbh 60 cm	14	0.949
	F_{15} = -0.36310 + 0.01252×G 0.697 is constant from gbh 78 cm	14	0.933
	F_{20} = 1.34008 - 69.21674 / G 0.661 is constant from gbh 102 cm	14	0.864
Kanthal	$\log(V_t)$ = -11.06320 + 2.18203×log(G)	119	0.970
	$\log(V_t)$ = -10.99533 + 1.80823×log(G) + 0.68951×log(H)	119	0.983
	F_{ub} = G/ (3.4178 + 1.02183×G)	118	0.997
	F_5 = G/ (11.53636 + 1.00570×G + 0.00024×G^2)	118	0.968

Species	Selected Model	N	R^2
	F_{10} = 1.11123 -22.96773/ G 0.828 is constant from gbh 81 cm	118	0.968
	F_{15} = -0.37865 +0.01738×G + 0.00006×G^2 0.770 is constant from gbh 102 cm	119	0.850
	F_{20} = - 0.1894 + 0.0072×G 0.718 is constant from gbh 126 cm	119	0.800
Korai	log(V_t) = -11.50692 + 2.31757×log (G)	140	0.968
	log(V_t) = -11.19651 + 1.85690×log (G) + 0.67878×log(H)	140	0.979
	F_{ub} = G/ (4.71339 + 1.02449×G)	140	0.994
	F_5 = G/ (12.65919 + 1.05281vG)	138	0.977
	F_{10} = 1.11036 - 25.51349×G , 0.770 is constant from gbh 81 cm	124	0.843
	F_{15} = - 0..52064 + 0.0197×G - 0.00007×G^2 0.725 is constant from gbh 96 cm	104	0.840
	F_{20} = - 0.93939 + 0.02327×G - 0.00007×G^2 0.649 is constant from gbh 96 cm	83	0.865
Mahogany	log(V_t) = -11.46122 + 2.29592×log (G)	105	0.981
	log(V_t) = -11.27102 + 1.88064×log(G) + 0.64629×log (H)	105	0.990
	F_{ub} = G/ (4.52235 + 1.01229×G)	105	0.993
	F_5 = G/(19.22348 + 0.774085×G + 0.00208×G^2)	103	0.789
	F_{10} = 1.15448 - 26.78537/ G, 0.857 is constant from gbh 75 cm	84	0.892
	F_{15} = - 0.84673 + 0.02915×G - 0.00012×G^2 0.805 is constant from gbh 90 cm	63	0.908
	F_{20} = -0.26397 + 0.0082*G, 0.720 is constant from gbh 120 cm	42	0.926
Neem	log(V_t) = -11.33340 + 2.25814×log (G)	36	0.974
	log(V_t) = -11.42823 + 1.89235×log (G) + 0.71493×log (H)	36	0.985
	F_{ub} = G/ (4.52235+ 1.01229×G)	105	0.993
	F_5 = 1.00005 - 9.02065/ G	103	0.789
	F_{10} = 1.15448 - 26.78537/ G , 0.797 is constant from gbh 75 cm	84	0.892
	F_{15} = - 0.84673 +0.02915×G - 0.00012×G^2 0.729 is constant from gbh 81 cm	63	0.908
	F_{20} = - 0.26397 + 0.00820×G	42	0.770

Species	Selected Model	N	R^2
Pitraj	$\log(V_t) = -11.25645 + 2.25821 \times \log(G)$	105	0.973
	$\log(V_t) = -11.25528 + 1.98544 \times \log(G) + 0.47163 \times \log(H)$	105	0.987
	$F_{ub} = G/ (4.52235 + 1.01229 \times G)$	105	0.973
	$F_5 = G/ (21.37330 + 0.77370 \times G + 0.00172\ vG^2)$ 0.864 is constant from gbh 117 cm	104	0.935
	$F_{10} = 1.15448 - 26.7855/ G$, 0.811 is constant from gbh 78 cm	86	0.861
	$F_{15} = 1.21272 - 45.21082/ G$, 0.782 is constant from gbh 105 cm	59	0.836
	$F_{20} = 1.34008 - 69.21674/ G$, 0.717 is constant from gbh 111 cm	41	0.864
Rain Tree	$\log(V_t) = -11.37623 + 2.26924 \times \log(G)$	153	0.981
	$\log(V_t) = -11.31983 + 1.91118 \times \log(G) + 0.63606 \times \log(H)$	153	0.990
	$F_{ub} = G/ (4.79468 + 1.02087 \times G - 0.00001 \times G^2)$	153	0.996
	$F_5 = G/ (11.83487 + 1.05773 \times G)$	149	0.941
	$F_{10} = 1.5448 - 6.78537/G$, 0.766 is constant from gbh 69 cm		
	$F_{15} = 1.21272 - 45.21082/G$, 0.710 is constant from gbh 93 cm		
	$F20 = 1.34008 - 69.21674/G$, 0.661 is constant from gbh 102 cm		
Shimul	$\log(V_t) = -12.14029 + 2.48771 \times \log(G)$	19	0.988
	$\log(V_t) = -11.54528 + 1.93559 \times \log(G) + 0.70716 \times \log(H)$	19	0.992
	$F_{ub} = G/ (4.71088 + 1.02902 \times G)$	19	0.996
	$F_5 = G/ (39.30153 + 0.42284 \times G + 0.00411 \times G^2)$ 0.780 is constant from gbh 36 cm	19	0.887
	$F_{10} = -0.41831 + 0.0204 \times G - 0.00011 \times G^2$ 0.717 is constant from gbh 69 cm	19	0.904
	$F_{15} = - 0.41250 + 0.01649 \times G - 0.00005 \times G^2$ 0.667 is constant from gbh 90 cm	19	0.879
	$F_{20} = -0.16713 + 0.00406 \times G + 0.00003 \times G^2$ 0.592 is constant from gbh 90 cm	19	0.815

Table 3. One way volume tables for 11 important tree species of the home gardens of Bangladesh

GBH (cm)	Amm	**B**adi	Jam	Kodam	Kanthal	Korai	Mahogany	Neem	Pitraj	Rain Tree	Shimul
18	0.008	0.008	0.009	0.007	0.009	0.008	0.008	0.008	0.009	0.008	0.007
21	0.012	0.011	0.012	0.011	0.012	0.012	0.011	0.012	0.013	0.011	0.010
24	0.016	0.015	0.017	0.014	0.016	0.016	0.016	0.016	0.017	0.016	0.014
27	0.021	0.020	0.022	0.019	0.021	0.021	0.020	0.020	0.022	0.020	0.019
30	0.026	0.026	0.027	0.024	0.026	0.027	0.026	0.026	0.028	0.026	0.025
33	0.033	0.032	0.034	0.030	0.032	0.033	0.032	0.032	0.035	0.032	0.032
36	0.040	0.039	0.041	0.037	0.039	0.041	0.039	0.039	0.042	0.039	0.040
39	0.047	0.047	0.049	0.044	0.046	0.049	0.047	0.047	0.051	0.047	0.048
42	0.056	0.056	0.058	0.053	0.055	0.058	0.056	0.055	0.060	0.055	0.058
45	0.065	0.066	0.068	0.062	0.063	0.068	0.066	0.065	0.070	0.065	0.069
48	0.076	0.076	0.078	0.072	0.073	0.079	0.076	0.075	0.081	0.075	0.081
51	0.087	0.088	0.090	0.083	0.083	0.091	0.088	0.086	0.093	0.086	0.095
54	0.099	0.100	0.102	0.095	0.095	0.104	0.100	0.098	0.106	0.098	0.109
57	0.111	0.113	0.115	0.107	0.106	0.118	0.113	0.110	0.119	0.111	0.125
60	0.125	0.128	0.129	0.121	0.119	0.133	0.127	0.124	0.134	0.124	0.142
63	0.139	0.143	0.144	0.135	0.132	0.149	0.142	0.138	0.150	0.139	0.160
66	0.155	0.159	0.160	0.151	0.146	0.166	0.158	0.154	0.166	0.154	0.179
69	0.171	0.177	0.177	0.167	0.161	0.184	0.176	0.170	0.184	0.171	0.200
72	0.188	0.195	0.195	0.185	0.177	0.203	0.194	0.187	0.202	0.188	0.223
75	0.206	0.214	0.214	0.203	0.194	0.223	0.213	0.205	0.222	0.206	0.247
78	0.225	0.235	0.234	0.222	0.211	0.244	0.233	0.224	0.242	0.225	0.272
81	0.245	0.256	0.254	0.243	0.229	0.266	0.254	0.244	0.264	0.246	0.299
84	0.266	0.279	0.276	0.264	0.248	0.290	0.276	0.265	0.286	0.267	0.327
87	0.288	0.302	0.298	0.287	0.268	0.314	0.299	0.287	0.310	0.289	0.357
90	0.310	0.327	0.322	0.310	0.288	0.340	0.323	0.310	0.335	0.312	0.388
93	0.334	0.353	0.347	0.335	0.309	0.367	0.348	0.333	0.360	0.336	0.421
96	0.359	0.379	0.372	0.361	0.332	0.395	0.375	0.358	0.387	0.361	0.456
99	0.384	0.408	0.399	0.387	0.355	0.424	0.402	0.384	0.415	0.387	0.492
102	0.411	0.437	0.427	0.415	0.379	0.455	0.431	0.411	0.444	0.414	0.530
105	0.439	0.467	0.456	0.444	0.403	0.486	0.460	0.439	0.474	0.443	0.570
108	0.467		0.485		0.429	0.519	0.491		0.505	0.472	
111	0.497		0.516		0.455	0.553	0.523		0.537	0.502	
114	0.527		0.548		0.483	0.588	0.556		0.571	0.533	
117	0.559		0.581		0.511	0.625	0.590		0.605	0.566	
120	0.592		0.615		0.540	0.663	0.625		0.641	0.599	
123	0.626		0.650		0.570	0.702	0.662		0.677	0.634	
126	0.660		0.686		0.600	0.742	0.699		0.715	0.669	
129	0.696		0.724		0.632	0.784	0.738		0.754	0.706	
132	0.733		0.762		0.664	0.826	0.778		0.794	0.744	
135	0.771		0.801		0.698	0.871	0.819		0.836	0.783	
138	0.810		0.842		0.732	0.916	0.862			0.823	
141	0.850		0.884		0.767	0.963	0.906			0.864	
144	0.891		0.927		0.803	1.011	0.950			0.906	
147	0.933		0.971		0.840	1.061	0.996			0.950	
150	0.977		1.016		0.878	1.111	1.044			0.994	
153	1.021				0.917	1.164	1.092			1.040	
156	1.067				0.957	1.217	1.142			1.087	
159	1.113				0.997	1.272	1.193			1.135	
162	1.161				1.039	1.328	1.245			1.184	
165	1.210				1.081	1.386	1.299			1.234	
168	1.260				1.125	1.445	1.354			1.286	
171	1.311				1.169	1.506	1.410			1.338	

Table 4. Two way volume table (Gbh-height-volume) for **Am** growing in the home gardens of Bangladesh

Gbh (cm)	Height in meters						
	6	8	10	12	14	16	18
18	0.010	0.011	0.013	0.014	0.015	0.016	0.017
21	0.013	0.015	0.017	0.019	0.021	0.022	0.023
24	0.017	0.020	0.022	0.025	0.027	0.029	0.030
27	0.022	0.025	0.028	0.031	0.034	0.036	0.038
30	0.027	0.031	0.035	0.038	0.041	0.044	0.047
33	0.032	0.037	0.042	0.046	0.050	0.054	0.057
36	0.038	0.044	0.050	0.055	0.059	0.063	0.068
39	0.045	0.052	0.058	0.064	0.069	0.074	0.079
42	0.052	0.060	0.067	0.074	0.080	0.086	0.091
45	0.059	0.069	0.077	0.085	0.092	0.098	0.105
48	0.067	0.078	0.087	0.096	0.104	0.112	0.119
51	0.075	0.088	0.099	0.108	0.117	0.126	0.134
54	0.084	0.098	0.110	0.121	0.131	0.141	0.150
57	0.094	0.109	0.123	0.135	0.146	0.157	0.167
60	0.104	0.121	0.136	0.149	0.162	0.173	0.184
63	0.114	0.133	0.149	0.164	0.178	0.191	0.203
66	0.125	0.146	0.164	0.180	0.195	0.209	0.222
69	0.137	0.159	0.179	0.196	0.213	0.228	0.243
72	0.149	0.173	0.194	0.214	0.232	0.248	0.264
75	0.161	0.187	0.210	0.231	0.251	0.269	0.286
78	0.174	0.202	0.227	0.250	0.271	0.291	0.309
81	0.187	0.218	0.245	0.269	0.292	0.313	0.333
84	0.201	0.234	0.263	0.289	0.314	0.336	0.357
87	0.216	0.251	0.282	0.310	0.336	0.360	0.383
90	0.231	0.268	0.301	0.331	0.359	0.385	0.409
93	0.246	0.286	0.321	0.353	0.383	0.411	0.437
96	0.262	0.304	0.342	0.376	0.408	0.437	0.465
99	0.278	0.323	0.363	0.400	0.433	0.464	0.494
102	0.295	0.343	0.385	0.424	0.459	0.492	0.524
105	0.312	0.363	0.408	0.449	0.486	0.521	0.554
108	0.330	0.384	0.431	0.474	0.514	0.551	0.586
111	0.348	0.405	0.455	0.500	0.542	0.582	0.619
114	0.367	0.427	0.480	0.527	0.572	0.613	0.652
117	0.386	0.449	0.505	0.555	0.602	0.645	0.686
120	0.406	0.472	0.530	0.583	0.632	0.678	0.721
123	0.426	0.496	0.557	0.612	0.664	0.712	0.757
126	0.447	0.520	0.584	0.642	0.696	0.746	0.794
129	0.468	0.544	0.611	0.673	0.729	0.782	0.831
132	0.490	0.569	0.640	0.704	0.763	0.818	0.870
135	0.512	0.595	0.669	0.736	0.797	0.855	0.909
138	0.535	0.621	0.698	0.768	0.832	0.893	0.949
141	0.558	0.648	0.728	0.801	0.868	0.931	0.990
144	0.581	0.676	0.759	0.835	0.905	0.970	1.032
147	0.605	0.704	0.791	0.870	0.943	1.011	1.075
150	0.630	0.732	0.823	0.905	0.981	1.052	1.118
153	0.655	0.761	0.855	0.941	1.020	1.093	1.163
156	0.681	0.791	0.889	0.977	1.059	1.136	1.208
159	0.707	0.821	0.923	1.015	1.100	1.179	1.254
162	0.733	0.852	0.957	1.053	1.141	1.223	1.301
165	0.760	0.883	0.992	1.091	1.183	1.268	1.349
168	0.787	0.915	1.028	1.131	1.226	1.314	1.398
171	0.815	0.947	1.065	1.171	1.269	1.361	1.447

Table 5 Conversion factors to estimate the under bark volumes to different top end diameters for **Amm** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.764	0.456			
21	0.788	0.524			
24	0.808	0.576	0.243		
27	0.824	0.616	0.325		
30	0.837	0.647	0.391	0.075	
33	0.848	0.674	0.444	0.115	0.033
36	0.858	0.695	0.489	0.154	0.056
39	0.866	0.714	0.527	0.192	0.078
42	0.873	0.729	0.559	0.229	0.100
45	0.879	0.743	0.587	0.264	0.123
48	0.885	0.755	0.612	0.299	0.145
51	0.890	0.766	0.633	0.332	0.168
54	0.894	0.775	0.653	0.365	0.190
57	0.899	0.783	0.670	0.396	0.212
60	0.902	0.791	0.685	0.426	0.235
63	0.906	0.798	0.699	0.455	0.257
66	0.909	0.804	0.712	0.483	0.280
69	0.911	0.810	0.724	0.510	0.302
72	0.914	0.815	0.734	0.536	0.324
75	0.916	0.820	0.744	0.561	0.347
78	0.919	0.824	0.753	0.585	0.369
81	0.921	0.828	0.762	0.607	0.392
84	0.923	0.832	0.770	0.629	0.414
87	0.925	0.836	0.777	0.649	0.436
90	0.926	0.839	0.784	0.669	0.459
93	0.928	0.842	0.790	0.687	0.481
96	0.929	0.845	0.796	0.704	0.504
99	0.931	0.848	0.801	0.720	0.526
102	0.932	0.850	0.807	0.736	0.549
105	0.933	0.853	0.812	0.750	0.571
108	0.935	0.855	0.816	0.763	0.593
111	0.936	0.857	0.821	0.774	0.616
114	0.937	0.859	0.825	0.785	0.638
117	0.938	0.861	0.829	0.795	0.661
120	0.939	0.863	0.833	0.803	0.683
123	0.940	0.865	0.836	0.811	0.705
126	0.941	0.866	0.840	0.817	0.728
129	0.941	0.868	0.843	0.823	0.750
132	0.942	0.869	0.846	0.827	0.773
135	0.943	0.871	0.849	0.830	0.773
138	0.944	0.872	0.852	0.832	0.773
141	0.944	0.873	0.855	0.833	0.773
144	0.945	0.875	0.857	0.833	0.773
147	0.946	0.876	0.860	0.832	0.773
150	0.946	0.877	0.862	0.830	0.773
153	0.947	0.878	0.865	0.827	0.773
156	0.948	0.879	0.867	0.823	0.773
159	0.948	0.880	0.869	0.817	0.773
162	0.949	0.881	0.871	0.811	0.773
165	0.949	0.882	0.873	0.803	0.773

Table 6. Two way volume table (Gbh-height-volume) for B**adi** growing in the home gardens of Bangladesh

Gbh	Height in meters					
(cm)	6	8	10	12	14	16
18	0.009	0.011	0.012	0.014	0.015	0.016
21	0.013	0.015	0.017	0.019	0.020	0.022
24	0.017	0.020	0.022	0.025	0.027	0.029
27	0.021	0.025	0.028	0.031	0.034	0.037
30	0.026	0.031	0.035	0.038	0.042	0.045
33	0.032	0.037	0.042	0.047	0.051	0.055
36	0.038	0.044	0.050	0.056	0.061	0.065
39	0.044	0.052	0.059	0.065	0.071	0.077
42	0.051	0.060	0.068	0.076	0.083	0.089
45	0.059	0.069	0.079	0.087	0.095	0.103
48	0.067	0.079	0.090	0.099	0.108	0.117
51	0.076	0.089	0.101	0.112	0.122	0.132
54	0.085	0.100	0.114	0.126	0.137	0.148
57	0.095	0.112	0.127	0.140	0.153	0.165
60	0.105	0.124	0.141	0.156	0.170	0.183
63	0.116	0.137	0.155	0.172	0.187	0.202
66	0.128	0.150	0.170	0.189	0.206	0.222
69	0.140	0.164	0.186	0.206	0.225	0.243
72	0.152	0.179	0.203	0.225	0.245	0.265
75	0.165	0.194	0.220	0.244	0.266	0.287
78	0.179	0.210	0.239	0.264	0.288	0.311
81	0.193	0.227	0.257	0.285	0.311	0.336
84	0.208	0.244	0.277	0.307	0.335	0.361
87	0.223	0.262	0.297	0.330	0.360	0.388
90	0.239	0.281	0.318	0.353	0.385	0.415
93	0.255	0.300	0.340	0.377	0.411	0.443
96	0.272	0.320	0.363	0.402	0.438	0.473
99	0.289	0.340	0.386	0.428	0.467	0.503
102	0.307	0.361	0.410	0.454	0.496	0.534
105	0.326	0.383	0.435	0.482	0.525	0.566

Table 7. Conversion factors to estimate the under bark volumes to different top end diameters for **Badi** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.736	0.548			
21	0.761	0.577	0.002		
24	0.780	0.601	0.073		
27	0.796	0.621	0.142	0.013	
30	0.809	0.638	0.207	0.044	
33	0.821	0.652	0.269	0.075	
36	0.830	0.665	0.327	0.106	0.001
39	0.839	0.676	0.383	0.137	0.013
42	0.846	0.686	0.435	0.169	0.027
45	0.853	0.694	0.484	0.200	0.042
48	0.859	0.702	0.529	0.231	0.059
51	0.864	0.709	0.572	0.262	0.078
54	0.869	0.715	0.611	0.293	0.098
57	0.874	0.720	0.647	0.324	0.120
60	0.878	0.725	0.679	0.356	0.143
63	0.882	0.730	0.709	0.387	0.168
66	0.885	0.734	0.709	0.418	0.195
69	0.888	0.738	0.709	0.449	0.224
72	0.892	0.742	0.709	0.480	0.254
75	0.894	0.745	0.709	0.511	0.285
78	0.897	0.748	0.709	0.543	0.318
81	0.900	0.751	0.709	0.574	0.353
84	0.902	0.754	0.709	0.605	0.390
87	0.904	0.756	0.709	0.636	0.428
90	0.907	0.758	0.709	0.667	0.468
93	0.909	0.761	0.709	0.667	0.509
96	0.911	0.763	0.709	0.667	0.552
99	0.913	0.764	0.709	0.667	0.597
102	0.914	0.766	0.709	0.667	0.597
105	0.916	0.768	0.709	0.667	0.597

Table 8. Two way volume table (Gbh-height-volume) for **Jam** growing in the home gardens of Bangladesh

Gbh	Height in meters								
(cm)	4	6	8	10	12	14	16	18	20
18	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.015	0.016
21	0.012	0.014	0.015	0.017	0.018	0.019	0.020	0.021	0.022
24	0.015	0.018	0.020	0.022	0.023	0.025	0.026	0.028	0.029
27	0.019	0.023	0.025	0.028	0.030	0.032	0.033	0.035	0.036
30	0.024	0.028	0.031	0.034	0.037	0.039	0.041	0.043	0.045
33	0.029	0.034	0.038	0.041	0.044	0.047	0.050	0.052	0.054
36	0.034	0.040	0.045	0.049	0.053	0.056	0.059	0.062	0.065
39	0.040	0.047	0.053	0.058	0.062	0.066	0.070	0.073	0.076
42	0.047	0.055	0.061	0.067	0.072	0.077	0.081	0.085	0.088
45	0.054	0.063	0.070	0.077	0.083	0.088	0.093	0.097	0.101
48	0.061	0.072	0.080	0.088	0.094	0.100	0.106	0.111	0.115
51	0.069	0.081	0.091	0.099	0.106	0.113	0.119	0.125	0.130
54	0.077	0.091	0.102	0.111	0.119	0.127	0.134	0.140	0.146
57	0.086	0.101	0.113	0.124	0.133	0.141	0.149	0.156	0.163
60	0.095	0.112	0.125	0.137	0.147	0.157	0.165	0.173	0.180
63	0.105	0.123	0.138	0.151	0.162	0.173	0.182	0.191	0.199
66	0.115	0.135	0.152	0.166	0.178	0.190	0.200	0.209	0.218
69	0.126	0.148	0.166	0.181	0.195	0.207	0.219	0.229	0.239
72	0.137	0.161	0.181	0.198	0.212	0.226	0.238	0.249	0.260
75	0.149	0.175	0.196	0.214	0.230	0.245	0.258	0.271	0.282
78	0.161	0.189	0.212	0.232	0.249	0.265	0.279	0.293	0.305
81	0.174	0.204	0.229	0.250	0.269	0.286	0.301	0.316	0.329
84	0.187	0.220	0.246	0.269	0.289	0.307	0.324	0.340	0.354
87	0.201	0.236	0.264	0.289	0.310	0.330	0.348	0.364	0.380
90	0.215	0.252	0.283	0.309	0.332	0.353	0.372	0.390	0.407
93	0.229	0.269	0.302	0.330	0.355	0.377	0.397	0.416	0.434
96	0.245	0.287	0.322	0.352	0.378	0.402	0.424	0.444	0.463
99	0.260	0.305	0.342	0.374	0.402	0.427	0.451	0.472	0.492
102	0.276	0.324	0.363	0.397	0.427	0.454	0.478	0.501	0.523
105	0.293	0.344	0.385	0.421	0.452	0.481	0.507	0.531	0.554
108	0.310	0.364	0.408	0.445	0.479	0.509	0.536	0.562	0.586
111	0.327	0.384	0.431	0.470	0.506	0.537	0.567	0.594	0.619
114	0.345	0.405	0.454	0.496	0.533	0.567	0.598	0.626	0.653
117	0.363	0.427	0.478	0.523	0.562	0.597	0.630	0.660	0.688
120	0.382	0.449	0.503	0.550	0.591	0.628	0.663	0.694	0.724
123	0.402	0.472	0.529	0.578	0.621	0.660	0.696	0.729	0.761
126	0.422	0.495	0.555	0.606	0.652	0.693	0.731	0.766	0.798
129	0.442	0.519	0.582	0.636	0.683	0.726	0.766	0.802	0.837
132	0.463	0.544	0.609	0.666	0.716	0.761	0.802	0.840	0.876
135	0.484	0.569	0.637	0.696	0.749	0.796	0.839	0.879	0.917
138	0.506	0.594	0.666	0.728	0.782	0.832	0.877	0.919	0.958
141	0.528	0.620	0.695	0.760	0.817	0.868	0.915	0.959	1.000
144	0.551	0.647	0.725	0.792	0.852	0.906	0.955	1.000	1.043
147	0.574	0.675	0.756	0.826	0.888	0.944	0.995	1.043	1.087
150	0.598	0.702	0.787	0.860	0.925	0.983	1.036	1.086	1.132

Table 9. Conversion factors to estimate the under bark volumes to different top end diameters for **Jam** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.777	0.545	0.277		
21	0.800	0.580	0.315		
24	0.818	0.610	0.351		
27	0.833	0.635	0.386		
30	0.845	0.657	0.419	0.032	
33	0.856	0.676	0.452	0.084	
36	0.864	0.692	0.483	0.134	
39	0.872	0.707	0.513	0.182	
42	0.879	0.720	0.542	0.229	
45	0.884	0.732	0.569	0.274	
48	0.889	0.742	0.595	0.317	0.039
51	0.894	0.752	0.620	0.358	0.093
54	0.898	0.760	0.644	0.397	0.145
57	0.902	0.768	0.666	0.435	0.196
60	0.905	0.776	0.687	0.471	0.245
63	0.908	0.783	0.707	0.505	0.291
66	0.911	0.789	0.725	0.537	0.337
69	0.914	0.795	0.743	0.567	0.380
72	0.916	0.800	0.759	0.596	0.421
75	0.918	0.805	0.774	0.623	0.461
78	0.920	0.810	0.774	0.648	0.499
81	0.922	0.814	0.774	0.671	0.535
84	0.924	0.818	0.774	0.692	0.570
87	0.925	0.822	0.774	0.712	0.602
90	0.927	0.826	0.774	0.712	0.633
93	0.928	0.829	0.774	0.712	0.633
96	0.930	0.832	0.774	0.712	0.633
99	0.931	0.835	0.774	0.712	0.633
102	0.932	0.838	0.774	0.712	0.633
105	0.933	0.841	0.774	0.712	0.633
108	0.935	0.844	0.774	0.712	0.633
111	0.936	0.846	0.774	0.712	0.633
114	0.937	0.849	0.774	0.712	0.633
117	0.937	0.851	0.774	0.712	0.633
120	0.938	0.853	0.774	0.712	0.633
123	0.939	0.855	0.774	0.712	0.633
126	0.940	0.857	0.774	0.712	0.633
129	0.941	0.859	0.774	0.712	0.633
132	0.941	0.861	0.774	0.712	0.633
135	0.942	0.863	0.774	0.712	0.633
138	0.943	0.864	0.774	0.712	0.633
141	0.943	0.866	0.774	0.712	0.633
144	0.944	0.868	0.774	0.712	0.633
147	0.945	0.869	0.774	0.712	0.633
150	0.945	0.870	0.774	0.712	0.633

Table 10. Two way volume table (Gbh-height-volume) for **Kadam** growing in the home gardens of Bangladesh

Gbh (cm)	Height in meters						
	6	8	10	12	14	16	18
18	0.010	0.012	0.014	0.016	0.018	0.019	0.021
21	0.013	0.016	0.019	0.021	0.023	0.026	0.028
24	0.017	0.020	0.024	0.027	0.030	0.033	0.036
27	0.021	0.025	0.030	0.033	0.037	0.041	0.044
30	0.025	0.031	0.036	0.041	0.045	0.049	0.054
33	0.030	0.037	0.043	0.048	0.054	0.059	0.064
36	0.035	0.043	0.050	0.057	0.063	0.069	0.075
39	0.041	0.050	0.058	0.066	0.073	0.080	0.087
42	0.047	0.057	0.066	0.075	0.084	0.091	0.099
45	0.053	0.065	0.075	0.085	0.095	0.104	0.112
48	0.060	0.073	0.085	0.096	0.107	0.117	0.127
51	0.067	0.082	0.095	0.107	0.119	0.131	0.141
54	0.074	0.091	0.105	0.119	0.132	0.145	0.157
57	0.082	0.100	0.116	0.132	0.146	0.160	0.173
60	0.090	0.110	0.128	0.145	0.161	0.176	0.191
63	0.099	0.120	0.140	0.158	0.176	0.192	0.208
66	0.107	0.131	0.152	0.172	0.191	0.209	0.227
69	0.117	0.142	0.165	0.187	0.208	0.227	0.246
72	0.126	0.153	0.178	0.202	0.224	0.246	0.266
75	0.136	0.165	0.192	0.218	0.242	0.265	0.287
78	0.146	0.178	0.207	0.234	0.260	0.284	0.308
81	0.156	0.190	0.221	0.251	0.278	0.305	0.330
84	0.167	0.203	0.237	0.268	0.298	0.326	0.353
87	0.178	0.217	0.252	0.286	0.317	0.348	0.377
90	0.190	0.231	0.269	0.304	0.338	0.370	0.401
93	0.202	0.245	0.285	0.323	0.359	0.393	0.425
96	0.214	0.260	0.302	0.342	0.380	0.416	0.451
99	0.226	0.275	0.320	0.362	0.402	0.440	0.477
102	0.239	0.290	0.338	0.382	0.425	0.465	0.504
105	0.252	0.306	0.356	0.403	0.448	0.491	0.531

Table 11. Conversion factors to estimate the under bark volumes to different top end diameters for **Kadam** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.748	0.502			
21	0.776	0.547			
24	0.799	0.586	0.069		
27	0.818	0.620	0.150		
30	0.833	0.650	0.226		
33	0.847	0.677	0.299		
36	0.858	0.700	0.367	0.047	
39	0.868	0.720	0.432	0.108	
42	0.876	0.738	0.492	0.166	
45	0.884	0.754	0.549	0.222	
48	0.890	0.768	0.601	0.276	
51	0.897	0.781	0.650	0.328	
54	0.902	0.792	0.694	0.377	0.058
57	0.907	0.802	0.735	0.425	0.126
60	0.911	0.811	0.771	0.470	0.186
63	0.915	0.819	0.771	0.513	0.241
66	0.919	0.826	0.771	0.554	0.291
69	0.923	0.832	0.771	0.593	0.337
72	0.926	0.837	0.771	0.630	0.379
75	0.929	0.842	0.771	0.665	0.417
78	0.931	0.846	0.771	0.697	0.453
81	0.934	0.850	0.771	0.697	0.486
84	0.936	0.853	0.771	0.697	0.516
87	0.939	0.855	0.771	0.697	0.544
90	0.941	0.858	0.771	0.697	0.571
93	0.943	0.859	0.771	0.697	0.596
96	0.944	0.861	0.771	0.697	0.619
99	0.946	0.862	0.771	0.697	0.641
102	0.948	0.863	0.771	0.697	0.641
105	0.949	0.864	0.771	0.697	0.641

Table 12. Two way volume table (Gbh-height-volume) for **Kanthal** growing in the home gardens of Bangladesh

Gbh (cm)	Height in meters						
	6	8	10	12	14	16	18
18	0.011	0.013	0.015	0.017	0.019	0.021	0.023
21	0.014	0.017	0.020	0.023	0.025	0.028	0.030
24	0.018	0.022	0.026	0.029	0.032	0.036	0.039
27	0.022	0.027	0.032	0.036	0.040	0.044	0.048
30	0.027	0.033	0.038	0.044	0.049	0.053	0.058
33	0.032	0.039	0.046	0.052	0.058	0.063	0.069
36	0.038	0.046	0.054	0.061	0.067	0.074	0.080
39	0.043	0.053	0.062	0.070	0.078	0.086	0.093
42	0.050	0.061	0.071	0.080	0.089	0.098	0.106
45	0.056	0.069	0.080	0.091	0.101	0.111	0.120
48	0.063	0.077	0.090	0.102	0.114	0.124	0.135
51	0.071	0.086	0.100	0.114	0.127	0.139	0.151
54	0.078	0.096	0.111	0.126	0.140	0.154	0.167
57	0.086	0.105	0.123	0.139	0.155	0.170	0.184
60	0.095	0.116	0.135	0.153	0.170	0.186	0.202
63	0.104	0.126	0.147	0.167	0.186	0.204	0.221
66	0.113	0.137	0.160	0.182	0.202	0.221	0.240
69	0.122	0.149	0.174	0.197	0.219	0.240	0.260
72	0.132	0.161	0.187	0.213	0.236	0.259	0.281
75	0.142	0.173	0.202	0.229	0.254	0.279	0.303
78	0.152	0.186	0.217	0.246	0.273	0.299	0.325
81	0.163	0.199	0.232	0.263	0.292	0.321	0.348
84	0.174	0.212	0.248	0.281	0.312	0.342	0.371
87	0.186	0.226	0.264	0.299	0.333	0.365	0.396
90	0.197	0.241	0.281	0.318	0.354	0.388	0.421
93	0.209	0.255	0.298	0.338	0.375	0.412	0.446
96	0.222	0.270	0.315	0.358	0.398	0.436	0.473
99	0.234	0.286	0.333	0.378	0.420	0.461	0.500
102	0.247	0.302	0.352	0.399	0.444	0.486	0.528
105	0.261	0.318	0.371	0.420	0.468	0.513	0.556
108	0.274	0.334	0.390	0.442	0.492	0.539	0.585
111	0.288	0.351	0.410	0.465	0.517	0.567	0.615
114	0.302	0.369	0.430	0.488	0.543	0.595	0.645
117	0.317	0.387	0.451	0.511	0.569	0.623	0.676
120	0.332	0.405	0.472	0.535	0.595	0.653	0.708
123	0.347	0.423	0.494	0.560	0.622	0.682	0.740
126	0.362	0.442	0.516	0.585	0.650	0.713	0.773
129	0.378	0.461	0.538	0.610	0.678	0.744	0.807
132	0.394	0.481	0.561	0.636	0.707	0.775	0.841
135	0.411	0.501	0.584	0.662	0.737	0.808	0.876
138	0.427	0.521	0.608	0.689	0.766	0.840	0.911
141	0.444	0.542	0.632	0.716	0.797	0.874	0.948
144	0.461	0.563	0.656	0.744	0.828	0.908	0.984
147	0.479	0.584	0.681	0.773	0.859	0.942	1.022
150	0.497	0.606	0.707	0.801	0.891	0.977	1.060
153	0.515	0.628	0.732	0.830	0.924	1.013	1.098
156	0.533	0.650	0.759	0.860	0.957	1.049	1.138
159	0.552	0.673	0.785	0.890	0.990	1.086	1.177
162	0.571	0.696	0.812	0.921	1.024	1.123	1.218
165	0.590	0.720	0.839	0.952	1.059	1.161	1.259
168	0.610	0.744	0.867	0.983	1.094	1.199	1.301
171	0.630	0.768	0.896	1.015	1.129	1.238	1.343

Table 13. Conversion factors to estimate the under bark volumes to different top end diameters for **Kanthal** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.825	0.606			
21	0.844	0.641	0.018		
24	0.859	0.670	0.154	0.004	
27	0.871	0.695	0.261	0.047	0.005
30	0.880	0.716	0.346	0.089	0.027
33	0.889	0.734	0.415	0.130	0.048
36	0.895	0.749	0.473	0.169	0.070
39	0.901	0.763	0.522	0.208	0.091
42	0.906	0.775	0.564	0.245	0.113
45	0.911	0.786	0.601	0.282	0.135
48	0.915	0.795	0.633	0.317	0.156
51	0.918	0.804	0.661	0.352	0.178
54	0.922	0.811	0.686	0.385	0.199
57	0.924	0.818	0.708	0.417	0.221
60	0.927	0.825	0.728	0.448	0.243
63	0.929	0.831	0.747	0.478	0.264
66	0.931	0.836	0.763	0.507	0.286
69	0.933	0.841	0.778	0.535	0.307
72	0.935	0.845	0.792	0.562	0.329
75	0.937	0.849	0.805	0.587	0.351
78	0.938	0.853	0.817	0.612	0.372
81	0.940	0.856	0.828	0.635	0.394
84	0.941	0.860	0.838	0.658	0.415
87	0.942	0.863	0.847	0.679	0.437
90	0.944	0.865	0.856	0.700	0.459
93	0.945	0.868	0.864	0.719	0.480
96	0.946	0.870	0.872	0.737	0.502
99	0.947	0.873	0.879	0.754	0.523
102	0.948	0.875	0.886	0.770	0.545
105	0.948	0.877	0.892	0.785	0.567
108	0.949	0.878	0.899	0.799	0.588
111	0.950	0.880	0.904	0.811	0.610
114	0.951	0.882	0.910	0.823	0.631
117	0.951	0.883	0.915	0.833	0.653
120	0.952	0.884	0.920	0.843	0.675
123	0.953	0.886	0.925	0.851	0.696
126	0.953	0.887	0.929	0.859	0.718
129	0.954	0.888	0.933	0.865	0.739
132	0.954	0.889	0.937	0.870	0.761
135	0.955	0.890	0.941	0.874	0.783
138	0.955	0.891	0.945	0.877	0.804
141	0.956	0.892	0.948	0.879	0.826
144	0.956	0.893	0.952	0.880	0.847
147	0.957	0.893	0.955	0.880	0.869
150	0.957	0.894	0.958	0.878	0.891
153	0.958	0.895	0.961	0.876	0.912
156	0.958	0.895	0.964	0.872	0.934
159	0.958	0.896	0.967	0.868	0.955
162	0.959	0.896	0.969	0.862	0.977

Table 14. Two way volume table (Gbh-height-volume) for K**oroi** growing in the home gardens of Bangladesh

Gbh	Height in meters									
(cm)	6	8	10	12	14	16	18	20	22	24
18	0.010	0.012	0.014	0.016	0.018	0.019	0.021	0.022	0.024	0.025
21	0.013	0.016	0.019	0.021	0.023	0.026	0.028	0.030	0.032	0.034
24	0.017	0.021	0.024	0.027	0.030	0.033	0.036	0.038	0.041	0.043
27	0.021	0.026	0.030	0.034	0.037	0.041	0.044	0.048	0.051	0.054
30	0.026	0.031	0.036	0.041	0.046	0.050	0.054	0.058	0.062	0.066
33	0.031	0.037	0.043	0.049	0.054	0.059	0.064	0.069	0.074	0.078
36	0.036	0.044	0.051	0.058	0.064	0.070	0.076	0.081	0.087	0.092
39	0.042	0.051	0.059	0.067	0.074	0.081	0.088	0.094	0.101	0.107
42	0.048	0.058	0.068	0.077	0.085	0.093	0.101	0.108	0.116	0.123
45	0.054	0.066	0.077	0.087	0.097	0.106	0.115	0.123	0.131	0.139
48	0.061	0.075	0.087	0.098	0.109	0.119	0.129	0.139	0.148	0.157
51	0.069	0.083	0.097	0.110	0.122	0.134	0.145	0.155	0.166	0.176
54	0.076	0.093	0.108	0.122	0.136	0.148	0.161	0.173	0.184	0.196
57	0.084	0.103	0.119	0.135	0.150	0.164	0.178	0.191	0.204	0.216
60	0.093	0.113	0.131	0.149	0.165	0.181	0.196	0.210	0.224	0.238
63	0.102	0.123	0.144	0.163	0.181	0.198	0.214	0.230	0.245	0.260
66	0.111	0.135	0.157	0.177	0.197	0.216	0.233	0.251	0.268	0.284
69	0.120	0.146	0.170	0.193	0.214	0.234	0.254	0.272	0.291	0.308
72	0.130	0.158	0.184	0.208	0.231	0.253	0.274	0.295	0.314	0.334
75	0.140	0.171	0.199	0.225	0.250	0.273	0.296	0.318	0.339	0.360
78	0.151	0.184	0.214	0.242	0.268	0.294	0.318	0.342	0.365	0.387
81	0.162	0.197	0.229	0.259	0.288	0.315	0.341	0.367	0.391	0.415
84	0.173	0.211	0.245	0.277	0.308	0.337	0.365	0.392	0.419	0.444
87	0.185	0.225	0.262	0.296	0.329	0.360	0.390	0.419	0.447	0.474
90	0.197	0.239	0.279	0.315	0.350	0.383	0.415	0.446	0.476	0.505
93	0.209	0.255	0.296	0.335	0.372	0.407	0.441	0.474	0.506	0.536
96	0.222	0.270	0.314	0.355	0.395	0.432	0.468	0.503	0.536	0.569
99	0.235	0.286	0.333	0.376	0.418	0.458	0.496	0.532	0.568	0.603
102	0.249	0.302	0.352	0.398	0.442	0.484	0.524	0.563	0.600	0.637
105	0.262	0.319	0.371	0.420	0.466	0.510	0.553	0.594	0.634	0.672
108	0.276	0.336	0.391	0.442	0.491	0.538	0.583	0.626	0.668	0.708
111	0.291	0.353	0.411	0.465	0.517	0.566	0.613	0.658	0.702	0.745
114	0.306	0.371	0.432	0.489	0.543	0.595	0.644	0.692	0.738	0.783
117	0.321	0.390	0.454	0.513	0.570	0.624	0.676	0.726	0.775	0.822
120	0.336	0.409	0.475	0.538	0.597	0.654	0.708	0.761	0.812	0.861
123	0.352	0.428	0.498	0.563	0.625	0.685	0.742	0.797	0.850	0.902
126	0.368	0.447	0.520	0.589	0.654	0.716	0.776	0.833	0.889	0.943
129	0.384	0.467	0.544	0.615	0.683	0.748	0.810	0.870	0.928	0.985
132	0.401	0.488	0.567	0.642	0.713	0.781	0.846	0.908	0.969	1.028
135	0.418	0.508	0.592	0.670	0.743	0.814	0.882	0.947	1.010	1.072
138	0.436	0.530	0.616	0.697	0.774	0.848	0.918	0.986	1.052	1.116
141	0.453	0.551	0.641	0.726	0.806	0.882	0.956	1.027	1.095	1.162
144	0.471	0.573	0.667	0.755	0.838	0.918	0.994	1.068	1.139	1.208
147	0.490	0.596	0.693	0.784	0.871	0.953	1.033	1.109	1.183	1.255
150	0.509	0.618	0.719	0.814	0.904	0.990	1.072	1.152	1.229	1.303
153	0.528	0.641	0.746	0.845	0.938	1.027	1.112	1.195	1.275	1.352
156	0.547	0.665	0.774	0.876	0.972	1.065	1.153	1.239	1.321	1.402
159	0.567	0.689	0.802	0.907	1.007	1.103	1.195	1.283	1.369	1.452
162	0.587	0.713	0.830	0.939	1.043	1.142	1.237	1.329	1.417	1.504
165	0.607	0.738	0.859	0.972	1.079	1.181	1.280	1.375	1.466	1.556
168	0.628	0.763	0.888	1.005	1.116	1.222	1.323	1.421	1.516	1.609
171	0.649	0.789	0.918	1.038	1.153	1.262	1.367	1.469	1.567	1.662
174	0.670	0.815	0.948	1.073	1.191	1.304	1.412	1.517	1.618	1.717

Table 15. Conversion factors to estimate the under bark volumes to different top end diameters for K**oroi** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.777	0.569			
21	0.801	0.604			
24	0.819	0.633	0.047		
27	0.834	0.657	0.165		
30	0.846	0.678	0.260	0.007	
33	0.857	0.696	0.337	0.053	
36	0.865	0.712	0.402	0.098	
39	0.873	0.726	0.456	0.141	
42	0.880	0.738	0.503	0.183	
45	0.886	0.750	0.543	0.224	
48	0.891	0.760	0.579	0.264	0.016
51	0.895	0.769	0.610	0.302	0.065
54	0.899	0.777	0.638	0.339	0.113
57	0.903	0.784	0.663	0.375	0.160
60	0.907	0.791	0.685	0.409	0.205
63	0.910	0.798	0.705	0.443	0.249
66	0.912	0.803	0.724	0.475	0.292
69	0.915	0.809	0.741	0.505	0.333
72	0.917	0.814	0.756	0.535	0.373
75	0.920	0.819	0.770	0.563	0.412
78	0.922	0.823	0.770	0.590	0.450
81	0.924	0.827	0.770	0.616	0.486
84	0.925	0.831	0.770	0.640	0.521
87	0.927	0.835	0.770	0.663	0.555
90	0.929	0.838	0.770	0.685	0.588
93	0.930	0.841	0.770	0.706	0.619
96	0.931	0.844	0.770	0.725	0.649
99	0.933	0.847	0.770	0.725	0.649
102	0.934	0.850	0.770	0.725	0.649
105	0.935	0.852	0.770	0.725	0.649
108	0.936	0.855	0.770	0.725	0.649
111	0.937	0.857	0.770	0.725	0.649
114	0.938	0.859	0.770	0.725	0.649
117	0.939	0.861	0.770	0.725	0.649
120	0.940	0.863	0.770	0.725	0.649
123	0.941	0.865	0.770	0.725	0.649
126	0.942	0.867	0.770	0.725	0.649
129	0.942	0.869	0.770	0.725	0.649
132	0.943	0.871	0.770	0.725	0.649
135	0.944	0.872	0.770	0.725	0.649
138	0.945	0.874	0.770	0.725	0.649
141	0.945	0.875	0.770	0.725	0.649
144	0.946	0.877	0.770	0.725	0.649
147	0.946	0.878	0.770	0.725	0.649
150	0.947	0.879	0.770	0.725	0.649
153	0.948	0.881	0.770	0.725	0.649
156	0.948	0.882	0.770	0.725	0.649
159	0.949	0.883	0.770	0.725	0.649
162	0.949	0.884	0.770	0.725	0.649

Table 16. Two way volume table (Gbh-height-volume) for **Mahogany** growing in the home gardens of Bangladesh

Gbh (cm)	Height in meters							
	6	8	10	12	14	16	18	20
18	0.009	0.011	0.013	0.015	0.016	0.018	0.019	0.020
21	0.012	0.015	0.017	0.019	0.021	0.023	0.025	0.027
24	0.016	0.019	0.022	0.025	0.028	0.030	0.033	0.035
27	0.020	0.024	0.028	0.031	0.034	0.038	0.041	0.043
30	0.024	0.029	0.034	0.038	0.042	0.046	0.049	0.053
33	0.029	0.035	0.040	0.046	0.050	0.055	0.059	0.063
36	0.034	0.041	0.048	0.054	0.059	0.065	0.070	0.075
39	0.040	0.048	0.055	0.062	0.069	0.075	0.081	0.087
42	0.046	0.055	0.064	0.072	0.079	0.086	0.093	0.100
45	0.052	0.063	0.073	0.082	0.090	0.098	0.106	0.114
48	0.059	0.071	0.082	0.092	0.102	0.111	0.120	0.128
51	0.066	0.079	0.092	0.103	0.114	0.124	0.134	0.144
54	0.073	0.088	0.102	0.115	0.127	0.138	0.149	0.160
57	0.081	0.098	0.113	0.127	0.141	0.153	0.165	0.177
60	0.090	0.108	0.125	0.140	0.155	0.169	0.182	0.195
63	0.098	0.118	0.137	0.154	0.170	0.185	0.200	0.214
66	0.107	0.129	0.149	0.168	0.185	0.202	0.218	0.233
69	0.116	0.140	0.162	0.182	0.201	0.220	0.237	0.254
72	0.126	0.152	0.176	0.197	0.218	0.238	0.257	0.275
75	0.136	0.164	0.190	0.213	0.236	0.257	0.277	0.297
78	0.147	0.177	0.204	0.230	0.254	0.276	0.298	0.319
81	0.157	0.190	0.219	0.246	0.272	0.297	0.320	0.343
84	0.169	0.203	0.235	0.264	0.292	0.318	0.343	0.367
87	0.180	0.217	0.251	0.282	0.311	0.339	0.366	0.392
90	0.192	0.231	0.267	0.300	0.332	0.362	0.390	0.418
93	0.204	0.246	0.284	0.320	0.353	0.385	0.415	0.445
96	0.217	0.261	0.301	0.339	0.375	0.409	0.441	0.472
99	0.230	0.277	0.319	0.359	0.397	0.433	0.467	0.500
102	0.243	0.293	0.338	0.380	0.420	0.458	0.494	0.529
105	0.257	0.309	0.357	0.401	0.444	0.484	0.522	0.559
108	0.270	0.326	0.376	0.423	0.468	0.510	0.550	0.589
111	0.285	0.343	0.396	0.446	0.492	0.537	0.579	0.620
114	0.299	0.361	0.417	0.469	0.518	0.564	0.609	0.652
117	0.314	0.379	0.437	0.492	0.544	0.593	0.640	0.685
120	0.330	0.397	0.459	0.516	0.570	0.622	0.671	0.718
123	0.345	0.416	0.481	0.541	0.597	0.651	0.703	0.752
126	0.361	0.435	0.503	0.566	0.625	0.681	0.735	0.787
129	0.378	0.455	0.526	0.591	0.653	0.712	0.768	0.823
132	0.394	0.475	0.549	0.617	0.682	0.744	0.802	0.859
135	0.411	0.496	0.572	0.644	0.712	0.776	0.837	0.896
138	0.429	0.516	0.597	0.671	0.742	0.808	0.872	0.934
141	0.447	0.538	0.621	0.699	0.772	0.842	0.908	0.972
144	0.465	0.560	0.646	0.727	0.803	0.876	0.945	1.012
147	0.483	0.582	0.672	0.756	0.835	0.910	0.982	1.052
150	0.502	0.604	0.698	0.785	0.867	0.946	1.020	1.092
153	0.521	0.627	0.724	0.815	0.900	0.981	1.059	1.134
156	0.540	0.650	0.751	0.845	0.934	1.018	1.099	1.176
159	0.560	0.674	0.779	0.876	0.968	1.055	1.139	1.219
162	0.580	0.698	0.807	0.907	1.003	1.093	1.179	1.262
165	0.600	0.723	0.835	0.939	1.038	1.131	1.221	1.307

Table 17. Conversion factors to estimate the under bark volumes to different top end diameters for **Mahogany** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.791	0.499			
21	0.815	0.570			
24	0.833	0.624	0.038		
27	0.848	0.666	0.162		
30	0.860	0.699	0.262		
33	0.870	0.727	0.343		
36	0.879	0.749	0.410	0.047	0.031
39	0.886	0.769	0.468	0.108	0.056
42	0.893	0.785	0.517	0.166	0.080
45	0.899	0.800	0.559	0.222	0.105
48	0.904	0.812	0.596	0.276	0.130
51	0.908	0.823	0.629	0.328	0.154
54	0.912	0.833	0.658	0.377	0.179
57	0.916	0.842	0.685	0.425	0.203
60	0.919	0.850	0.708	0.470	0.228
63	0.922	0.857	0.729	0.513	0.253
66	0.925	0.863	0.749	0.554	0.277
69	0.928	0.869	0.766	0.593	0.302
72	0.930	0.875	0.782	0.630	0.326
75	0.932	0.880	0.797	0.665	0.351
78	0.934	0.884	0.811	0.697	0.376
81	0.936	0.889	0.824	0.727	0.400
84	0.938	0.893	0.836	0.755	0.425
87	0.940	0.896	0.847	0.781	0.449
90	0.941	0.900	0.857	0.805	0.474
93	0.943	0.903	0.857	0.805	0.499
96	0.944	0.906	0.857	0.805	0.523
99	0.945	0.909	0.857	0.805	0.548
102	0.946	0.912	0.857	0.805	0.572
105	0.948	0.914	0.857	0.805	0.597
108	0.949	0.917	0.857	0.805	0.622
111	0.950	0.919	0.857	0.805	0.646
114	0.951	0.921	0.857	0.805	0.671
117	0.952	0.923	0.857	0.805	0.695
120	0.952	0.925	0.857	0.805	0.720
123	0.953	0.927	0.857	0.805	0.720
126	0.954	0.928	0.857	0.805	0.720
129	0.955	0.930	0.857	0.805	0.720
132	0.956	0.932	0.857	0.805	0.720
135	0.956	0.933	0.857	0.805	0.720
138	0.957	0.935	0.857	0.805	0.720
141	0.958	0.936	0.857	0.805	0.720
144	0.958	0.937	0.857	0.805	0.720
147	0.959	0.939	0.857	0.805	0.720
150	0.959	0.940	0.857	0.805	0.720
153	0.960	0.941	0.857	0.805	0.720
156	0.960	0.942	0.857	0.805	0.720
159	0.961	0.943	0.857	0.805	0.720
162	0.961	0.944	0.857	0.805	0.720

Table 18. Two way volume table (Gbh-height-volume) for **Neem** growing in the home gardens of Bangladesh

Gbh (cm)	Height in meters						
	6	8	10	12	14	16	18
18	0.009	0.011	0.013	0.015	0.017	0.019	0.020
21	0.012	0.015	0.018	0.020	0.023	0.025	0.027
24	0.016	0.020	0.023	0.026	0.029	0.032	0.035
27	0.020	0.025	0.029	0.033	0.037	0.040	0.044
30	0.024	0.030	0.035	0.040	0.045	0.049	0.054
33	0.029	0.036	0.042	0.048	0.054	0.059	0.064
36	0.035	0.042	0.050	0.057	0.063	0.070	0.076
39	0.040	0.049	0.058	0.066	0.074	0.081	0.088
42	0.046	0.057	0.067	0.076	0.085	0.093	0.101
45	0.053	0.065	0.076	0.086	0.097	0.106	0.116
48	0.060	0.073	0.086	0.098	0.109	0.120	0.131
51	0.067	0.082	0.096	0.110	0.122	0.135	0.146
54	0.074	0.091	0.107	0.122	0.136	0.150	0.163
57	0.082	0.101	0.119	0.135	0.151	0.166	0.181
60	0.091	0.112	0.131	0.149	0.166	0.183	0.199
63	0.100	0.122	0.143	0.163	0.182	0.201	0.218
66	0.109	0.134	0.157	0.178	0.199	0.219	0.238
69	0.118	0.145	0.170	0.194	0.217	0.238	0.259
72	0.128	0.157	0.185	0.210	0.235	0.258	0.281
75	0.138	0.170	0.200	0.227	0.254	0.279	0.304
78	0.149	0.183	0.215	0.245	0.273	0.301	0.327
81	0.160	0.197	0.231	0.263	0.294	0.323	0.351
84	0.172	0.211	0.247	0.282	0.314	0.346	0.376
87	0.183	0.225	0.264	0.301	0.336	0.370	0.402
90	0.196	0.240	0.282	0.321	0.358	0.394	0.429
93	0.208	0.256	0.300	0.341	0.381	0.419	0.456
96	0.221	0.271	0.318	0.363	0.405	0.445	0.485
99	0.234	0.288	0.337	0.384	0.429	0.472	0.514
102	0.248	0.304	0.357	0.407	0.454	0.500	0.543
105	0.262	0.322	0.377	0.430	0.480	0.528	0.574
108	0.276	0.339	0.398	0.453	0.506	0.557	0.606
111	0.291	0.357	0.419	0.477	0.533	0.586	0.638
114	0.306	0.376	0.441	0.502	0.560	0.617	0.671
117	0.321	0.395	0.463	0.527	0.589	0.648	0.705
120	0.337	0.414	0.486	0.553	0.618	0.679	0.739
123	0.353	0.434	0.509	0.580	0.647	0.712	0.775
126	0.370	0.454	0.533	0.607	0.677	0.745	0.811
129	0.386	0.475	0.557	0.634	0.708	0.779	0.848
132	0.404	0.496	0.582	0.663	0.740	0.814	0.885
135	0.421	0.517	0.607	0.691	0.772	0.849	0.924
138	0.439	0.539	0.633	0.721	0.805	0.885	0.963
141	0.457	0.562	0.659	0.751	0.838	0.922	1.003
144	0.476	0.585	0.686	0.781	0.872	0.959	1.044
147	0.495	0.608	0.713	0.812	0.907	0.998	1.085
150	0.514	0.631	0.741	0.844	0.942	1.037	1.128
153	0.534	0.656	0.769	0.876	0.978	1.076	1.171
156	0.554	0.680	0.798	0.909	1.015	1.116	1.214
159	0.574	0.705	0.827	0.942	1.052	1.157	1.259
162	0.595	0.730	0.857	0.976	1.090	1.199	1.304

Table 19. Conversion factors to estimate the under bark volumes to different top end diameters for **Neem** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.791	0.532			
21	0.815	0.577			
24	0.833	0.615	0.038		
27	0.848	0.648	0.162		
30	0.860	0.677	0.262		
33	0.870	0.702	0.343		
36	0.879	0.723	0.410	0.047	0.031
39	0.886	0.742	0.468	0.108	0.056
42	0.893	0.758	0.517	0.166	0.080
45	0.899	0.772	0.559	0.222	0.105
48	0.904	0.785	0.596	0.276	0.130
51	0.908	0.795	0.629	0.328	0.154
54	0.912	0.805	0.658	0.377	0.179
57	0.916	0.813	0.685	0.425	0.203
60	0.919	0.820	0.708	0.470	0.228
63	0.922	0.826	0.729	0.513	0.253
66	0.925	0.831	0.749	0.554	0.277
69	0.928	0.836	0.766	0.593	0.302
72	0.930	0.840	0.782	0.630	0.326
75	0.932	0.843	0.797	0.665	0.351
78	0.934	0.845	0.797	0.697	0.376
81	0.936	0.847	0.797	0.727	0.400
84	0.938	0.849	0.797	0.727	0.425
87	0.940	0.850	0.797	0.727	0.449
90	0.941	0.851	0.797	0.727	0.474
93	0.943	0.851	0.797	0.727	0.499
96	0.944	0.852	0.797	0.727	0.523
99	0.945	0.851	0.797	0.727	0.548
102	0.946	0.851	0.797	0.727	0.572
105	0.948	0.850	0.797	0.727	0.597
108	0.949	0.850	0.797	0.727	0.622
111	0.950	0.849	0.797	0.727	0.646
114	0.951	0.847	0.797	0.727	0.671
117	0.952	0.846	0.797	0.727	0.695
120	0.952	0.844	0.797	0.727	0.720

Table 20. Two way volume table (Gbh-height-volume) for **Pitraj** growing in the home gardens of Bangladesh

Gbh (cm)	Height in meters						
	6	8	10	12	14	16	18
18	0.009	0.011	0.012	0.013	0.014	0.015	0.016
21	0.013	0.015	0.016	0.018	0.019	0.020	0.021
24	0.017	0.019	0.021	0.023	0.025	0.026	0.028
27	0.021	0.024	0.027	0.029	0.031	0.033	0.035
30	0.026	0.030	0.033	0.036	0.038	0.041	0.043
33	0.031	0.036	0.040	0.043	0.046	0.050	0.052
36	0.037	0.042	0.047	0.051	0.055	0.059	0.062
39	0.043	0.050	0.055	0.060	0.065	0.069	0.073
42	0.050	0.058	0.064	0.070	0.075	0.080	0.084
45	0.058	0.066	0.073	0.080	0.086	0.092	0.097
48	0.066	0.075	0.083	0.091	0.098	0.104	0.110
51	0.074	0.085	0.094	0.103	0.110	0.118	0.124
54	0.083	0.095	0.105	0.115	0.124	0.132	0.139
57	0.092	0.106	0.117	0.128	0.138	0.147	0.155
60	0.102	0.117	0.130	0.142	0.152	0.162	0.172
63	0.113	0.129	0.143	0.156	0.168	0.179	0.189
66	0.123	0.141	0.157	0.171	0.184	0.196	0.207
69	0.135	0.154	0.172	0.187	0.201	0.214	0.226
72	0.147	0.168	0.187	0.203	0.219	0.233	0.246
75	0.159	0.182	0.202	0.221	0.237	0.253	0.267
78	0.172	0.197	0.219	0.239	0.256	0.273	0.289
81	0.185	0.212	0.236	0.257	0.276	0.294	0.311
84	0.199	0.228	0.254	0.276	0.297	0.316	0.335
87	0.214	0.245	0.272	0.296	0.319	0.339	0.359
90	0.229	0.262	0.291	0.317	0.341	0.363	0.384
93	0.244	0.279	0.310	0.338	0.364	0.387	0.409
96	0.260	0.298	0.331	0.360	0.387	0.413	0.436
99	0.276	0.316	0.351	0.383	0.412	0.439	0.464
102	0.293	0.336	0.373	0.406	0.437	0.465	0.492
105	0.310	0.355	0.395	0.430	0.463	0.493	0.521
108	0.328	0.376	0.418	0.455	0.489	0.521	0.551
111	0.347	0.397	0.441	0.481	0.517	0.550	0.582
114	0.365	0.418	0.465	0.507	0.545	0.580	0.613
117	0.385	0.441	0.490	0.533	0.574	0.611	0.646
120	0.405	0.463	0.515	0.561	0.603	0.643	0.679
123	0.425	0.487	0.541	0.589	0.634	0.675	0.713
126	0.446	0.510	0.567	0.618	0.665	0.708	0.748
129	0.467	0.535	0.594	0.648	0.696	0.742	0.784
132	0.489	0.560	0.622	0.678	0.729	0.776	0.821
135	0.511	0.585	0.650	0.709	0.762	0.812	0.858
138	0.534	0.612	0.679	0.740	0.796	0.848	0.896
141	0.557	0.638	0.709	0.773	0.831	0.885	0.936
144	0.581	0.665	0.739	0.806	0.866	0.923	0.975
147	0.605	0.693	0.770	0.839	0.903	0.961	1.016
150	0.630	0.722	0.802	0.874	0.940	1.001	1.058

Table 21. Conversion factors to estimate the under bark volumes to different top end diameters for **Pitraj** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.791	0.502			
21	0.815	0.547			
24	0.833	0.586	0.038		
27	0.848	0.620	0.162		
30	0.860	0.650	0.262		
33	0.870	0.677	0.343		
36	0.879	0.700	0.410		
39	0.886	0.720	0.468	0.053	
42	0.893	0.738	0.517	0.136	
45	0.899	0.754	0.559	0.208	
48	0.904	0.768	0.596	0.271	
51	0.908	0.781	0.629	0.326	
54	0.912	0.792	0.658	0.375	0.058
57	0.916	0.802	0.685	0.420	0.126
60	0.919	0.811	0.708	0.459	0.186
63	0.922	0.819	0.729	0.495	0.241
66	0.925	0.826	0.749	0.528	0.291
69	0.928	0.832	0.766	0.557	0.337
72	0.930	0.837	0.782	0.585	0.379
75	0.932	0.842	0.797	0.610	0.417
78	0.934	0.846	0.811	0.633	0.453
81	0.936	0.850	0.811	0.655	0.486
84	0.938	0.853	0.811	0.674	0.516
87	0.940	0.855	0.811	0.693	0.544
90	0.941	0.858	0.811	0.710	0.571
93	0.943	0.859	0.811	0.727	0.596
96	0.944	0.861	0.811	0.742	0.619
99	0.945	0.862	0.811	0.756	0.641
102	0.946	0.863	0.811	0.769	0.661
105	0.948	0.864	0.811	0.782	0.681
108	0.949	0.864	0.811	0.782	0.699
111	0.950	0.864	0.811	0.782	0.717
114	0.951	0.864	0.811	0.782	0.717
117	0.952	0.864	0.811	0.782	0.717
120	0.952	0.864	0.811	0.782	0.717
123	0.953	0.864	0.811	0.782	0.717
126	0.954	0.864	0.811	0.782	0.717
129	0.955	0.864	0.811	0.782	0.717
132	0.956	0.864	0.811	0.782	0.717
135	0.956	0.864	0.811	0.782	0.717
138	0.957	0.864	0.811	0.782	0.717
141	0.958	0.864	0.811	0.782	0.717
144	0.958	0.864	0.811	0.782	0.717
147	0.959	0.864	0.811	0.782	0.717
150	0.959	0.864	0.811	0.782	0.717

Table 22. Two way volume table (Gbh-height-volume) for **Rain tree** growing in the home gardens of Bangladesh

Gbh (cm)	Height in meters									
	6	8	10	12	14	16	18	20	22	24
18	0.010	0.011	0.013	0.015	0.016	0.018	0.019	0.020	0.022	0.023
21	0.013	0.015	0.018	0.020	0.022	0.024	0.026	0.027	0.029	0.031
24	0.016	0.020	0.023	0.026	0.028	0.031	0.033	0.035	0.038	0.040
27	0.021	0.025	0.029	0.032	0.035	0.038	0.041	0.044	0.047	0.050
30	0.025	0.030	0.035	0.039	0.043	0.047	0.051	0.054	0.058	0.061
33	0.030	0.036	0.042	0.047	0.052	0.056	0.061	0.065	0.069	0.073
36	0.036	0.043	0.049	0.056	0.061	0.067	0.072	0.077	0.082	0.086
39	0.042	0.050	0.058	0.065	0.071	0.078	0.084	0.090	0.095	0.101
42	0.048	0.058	0.066	0.075	0.082	0.090	0.097	0.103	0.110	0.116
45	0.055	0.066	0.076	0.085	0.094	0.102	0.110	0.118	0.125	0.132
48	0.062	0.074	0.086	0.096	0.106	0.116	0.125	0.133	0.142	0.150
51	0.070	0.084	0.096	0.108	0.119	0.130	0.140	0.150	0.159	0.168
54	0.078	0.093	0.107	0.121	0.133	0.145	0.156	0.167	0.177	0.187
57	0.086	0.103	0.119	0.134	0.147	0.161	0.173	0.185	0.197	0.208
60	0.095	0.114	0.131	0.147	0.163	0.177	0.191	0.204	0.217	0.229
63	0.104	0.125	0.144	0.162	0.179	0.194	0.209	0.224	0.238	0.252
66	0.114	0.137	0.158	0.177	0.195	0.212	0.229	0.245	0.260	0.275
69	0.124	0.149	0.172	0.193	0.212	0.231	0.249	0.267	0.283	0.299
72	0.134	0.161	0.186	0.209	0.230	0.251	0.270	0.289	0.307	0.325
75	0.145	0.175	0.201	0.226	0.249	0.271	0.292	0.313	0.332	0.351
78	0.157	0.188	0.217	0.243	0.269	0.292	0.315	0.337	0.358	0.378
81	0.168	0.202	0.233	0.262	0.289	0.314	0.339	0.362	0.385	0.407
84	0.180	0.217	0.250	0.280	0.309	0.337	0.363	0.388	0.412	0.436
87	0.193	0.232	0.267	0.300	0.331	0.360	0.388	0.415	0.441	0.466
90	0.206	0.247	0.285	0.320	0.353	0.384	0.414	0.443	0.471	0.497
93	0.219	0.263	0.303	0.341	0.376	0.409	0.441	0.472	0.501	0.530
96	0.233	0.280	0.322	0.362	0.399	0.435	0.469	0.501	0.532	0.563
99	0.247	0.297	0.342	0.384	0.424	0.461	0.497	0.531	0.565	0.597
102	0.262	0.314	0.362	0.407	0.448	0.488	0.526	0.563	0.598	0.632
105	0.276	0.332	0.383	0.430	0.474	0.516	0.556	0.595	0.632	0.668
108	0.292	0.350	0.404	0.453	0.500	0.544	0.587	0.628	0.667	0.705
111	0.307	0.369	0.426	0.478	0.527	0.574	0.618	0.661	0.703	0.743
114	0.324	0.389	0.448	0.503	0.555	0.604	0.651	0.696	0.739	0.781
117	0.340	0.408	0.471	0.528	0.583	0.634	0.684	0.731	0.777	0.821
120	0.357	0.429	0.494	0.555	0.612	0.666	0.718	0.768	0.815	0.862
123	0.374	0.449	0.518	0.581	0.641	0.698	0.752	0.805	0.855	0.904
126	0.392	0.470	0.542	0.609	0.672	0.731	0.788	0.843	0.895	0.946
129	0.410	0.492	0.567	0.637	0.702	0.765	0.824	0.881	0.936	0.990
132	0.428	0.514	0.593	0.665	0.734	0.799	0.861	0.921	0.978	1.034
135	0.447	0.537	0.619	0.695	0.766	0.834	0.899	0.961	1.021	1.079
138	0.466	0.560	0.645	0.724	0.799	0.870	0.938	1.003	1.065	1.126
141	0.486	0.583	0.672	0.755	0.833	0.906	0.977	1.045	1.110	1.173
144	0.506	0.607	0.700	0.786	0.867	0.944	1.017	1.087	1.155	1.221
147	0.526	0.632	0.728	0.817	0.902	0.981	1.058	1.131	1.202	1.270
150	0.547	0.656	0.757	0.850	0.937	1.020	1.099	1.176	1.249	1.320
153	0.568	0.682	0.786	0.882	0.973	1.059	1.142	1.221	1.297	1.371
156	0.589	0.708	0.815	0.916	1.010	1.100	1.185	1.267	1.346	1.423
159	0.611	0.734	0.846	0.950	1.047	1.140	1.229	1.314	1.396	1.476
162	0.633	0.760	0.876	0.984	1.086	1.182	1.274	1.362	1.447	1.529
165	0.656	0.788	0.908	1.019	1.124	1.224	1.319	1.411	1.499	1.584
168	0.679	0.815	0.939	1.055	1.164	1.267	1.365	1.460	1.551	1.640
171	0.702	0.843	0.972	1.091	1.204	1.310	1.412	1.510	1.605	1.696
174	0.726	0.872	1.005	1.128	1.244	1.355	1.460	1.561	1.659	1.753

Table 23. Conversion factors to estimate the under bark volumes to different top end diameters for **Rain tree** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
18	0.777	0.583			
21	0.801	0.617			
24	0.819	0.645	0.038		
27	0.835	0.668	0.162		
30	0.847	0.689	0.262		
33	0.858	0.706	0.343		
36	0.867	0.721	0.410		
39	0.875	0.735	0.468	0.053	
42	0.881	0.747	0.517	0.136	
45	0.887	0.757	0.559	0.208	
48	0.893	0.767	0.596	0.271	
51	0.897	0.775	0.629	0.326	
54	0.902	0.783	0.658	0.375	0.058
57	0.905	0.790	0.685	0.420	0.126
60	0.909	0.797	0.708	0.459	0.186
63	0.912	0.803	0.729	0.495	0.241
66	0.915	0.808	0.749	0.528	0.291
69	0.918	0.814	0.766	0.557	0.337
72	0.920	0.818	0.766	0.585	0.379
75	0.922	0.823	0.766	0.610	0.417
78	0.925	0.827	0.766	0.633	0.453
81	0.927	0.831	0.766	0.655	0.486
84	0.928	0.834	0.766	0.674	0.516
87	0.930	0.838	0.766	0.693	0.544
90	0.932	0.841	0.766	0.710	0.571
93	0.933	0.844	0.766	0.727	0.596
96	0.935	0.847	0.766	0.727	0.619
99	0.936	0.849	0.766	0.727	0.641
102	0.937	0.852	0.766	0.727	0.661
105	0.939	0.854	0.766	0.727	0.661
108	0.940	0.857	0.766	0.727	0.661
111	0.941	0.859	0.766	0.727	0.661
114	0.942	0.861	0.766	0.727	0.661
117	0.943	0.863	0.766	0.727	0.661
120	0.944	0.865	0.766	0.727	0.661
123	0.945	0.867	0.766	0.727	0.661
126	0.945	0.868	0.766	0.727	0.661
129	0.946	0.870	0.766	0.727	0.661
132	0.947	0.872	0.766	0.727	0.661
135	0.948	0.873	0.766	0.727	0.661
138	0.949	0.875	0.766	0.727	0.661
141	0.949	0.876	0.766	0.727	0.661
144	0.950	0.877	0.766	0.727	0.661
147	0.951	0.879	0.766	0.727	0.661
150	0.951	0.880	0.766	0.727	0.661
153	0.952	0.881	0.766	0.727	0.661
156	0.952	0.882	0.766	0.727	0.661
159	0.953	0.883	0.766	0.727	0.661
162	0.953	0.884	0.766	0.727	0.661

Table 24. Two way volume table (Gbh-height-volume) for **Shimul** growing in the home gardens of Bangladesh

Gbh (cm)	Height in meters							
	6	8	10	12	14	16	18	20
24	0.016	0.020	0.023	0.026	0.029	0.032	0.035	0.038
27	0.020	0.025	0.029	0.033	0.037	0.041	0.044	0.047
30	0.025	0.030	0.036	0.041	0.045	0.050	0.054	0.058
33	0.030	0.037	0.043	0.049	0.054	0.060	0.065	0.070
36	0.035	0.043	0.051	0.058	0.064	0.071	0.077	0.083
39	0.041	0.051	0.059	0.067	0.075	0.083	0.090	0.097
42	0.048	0.058	0.068	0.078	0.087	0.095	0.104	0.112
45	0.054	0.067	0.078	0.089	0.099	0.109	0.118	0.128
48	0.062	0.076	0.089	0.101	0.112	0.123	0.134	0.145
51	0.069	0.085	0.100	0.113	0.126	0.139	0.151	0.163
54	0.078	0.095	0.111	0.127	0.141	0.155	0.169	0.182
57	0.086	0.105	0.124	0.141	0.157	0.172	0.187	0.202
60	0.095	0.117	0.136	0.155	0.173	0.190	0.207	0.223
63	0.104	0.128	0.150	0.171	0.190	0.209	0.227	0.245
66	0.114	0.140	0.164	0.187	0.208	0.229	0.249	0.268
69	0.125	0.153	0.179	0.203	0.227	0.249	0.271	0.292
72	0.135	0.166	0.194	0.221	0.246	0.271	0.294	0.317
75	0.146	0.179	0.210	0.239	0.267	0.293	0.318	0.343
78	0.158	0.194	0.227	0.258	0.288	0.316	0.344	0.370
81	0.170	0.208	0.244	0.277	0.309	0.340	0.370	0.398
84	0.182	0.223	0.262	0.298	0.332	0.365	0.396	0.427
87	0.195	0.239	0.280	0.319	0.355	0.390	0.424	0.457
90	0.208	0.255	0.299	0.340	0.379	0.417	0.453	0.488
93	0.222	0.272	0.319	0.362	0.404	0.444	0.483	0.520
96	0.236	0.289	0.339	0.385	0.430	0.472	0.513	0.553
99	0.251	0.307	0.360	0.409	0.456	0.501	0.545	0.587
102	0.265	0.325	0.381	0.433	0.483	0.531	0.577	0.622
105	0.281	0.344	0.403	0.458	0.511	0.562	0.611	0.658
108	0.297	0.363	0.426	0.484	0.540	0.593	0.645	0.695
111	0.313	0.383	0.449	0.511	0.569	0.626	0.680	0.733
114	0.329	0.404	0.473	0.538	0.599	0.659	0.716	0.771
117	0.346	0.424	0.497	0.565	0.630	0.693	0.753	0.811
120	0.364	0.446	0.522	0.594	0.662	0.728	0.791	0.852

Table 25. Conversion factors to estimate the under bark volumes to different top end diameters for **Shimul** growing in the home gardens of Bangladesh

Gbh (cm)	F_{ub}	F_5	F_{10}	F_{15}	F_{20}
24	0.816	0.562	0.095		
27	0.831	0.622	0.151		
30	0.843	0.678	0.204	0.037	0.132
33	0.853	0.731	0.255	0.077	0.150
36	0.862	0.780	0.305	0.116	0.168
39	0.870	0.780	0.352	0.155	0.187
42	0.876	0.780	0.397	0.192	0.207
45	0.882	0.780	0.441	0.228	0.227
48	0.887	0.780	0.482	0.264	0.247
51	0.892	0.780	0.522	0.298	0.268
54	0.896	0.780	0.559	0.332	0.290
57	0.900	0.780	0.595	0.365	0.312
60	0.903	0.780	0.628	0.397	0.335
63	0.906	0.780	0.660	0.428	0.358
66	0.909	0.780	0.689	0.458	0.382
69	0.911	0.780	0.717	0.487	0.406
72	0.914	0.780	0.717	0.516	0.431
75	0.916	0.780	0.717	0.543	0.457
78	0.918	0.780	0.717	0.570	0.482
81	0.920	0.780	0.717	0.595	0.509
84	0.922	0.780	0.717	0.620	0.536
87	0.923	0.780	0.717	0.644	0.564
90	0.925	0.780	0.717	0.667	0.592
93	0.926	0.780	0.717	0.667	0.592
96	0.928	0.780	0.717	0.667	0.592
99	0.929	0.780	0.717	0.667	0.592
102	0.930	0.780	0.717	0.667	0.592
105	0.931	0.780	0.717	0.667	0.592
108	0.932	0.780	0.717	0.667	0.592
111	0.933	0.780	0.717	0.667	0.592
114	0.934	0.780	0.717	0.667	0.592
117	0.935	0.780	0.717	0.667	0.592
120	0.936	0.780	0.717	0.667	0.592