

Tree diversity in the homestead and cropland areas of Madhupur upazila under Tangail district

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Abstract: The study was conducted at three unions (Alokdia, Ausnara and Arankhola) of Madhupur upazila under Tangail district to determine the tree diversity in homestead and cropland areas and to explore their relationships with the selected characteristics of the farmers of the study area of Bangladesh. One hundred farmers were selected for the study of which 40 from Alokdia, 30 from Ausnara and the rest 30 from Arankhola union of Madhupur upazila of Tangail district. An interview schedule with simple technique and visual observation was used to determine some parameters. The respondents were selected randomly and used for collecting data during the period from 26 March to 9 April 2010. Pearson's Product Moment Correlation Co-efficient (r) was used for statistical analysis along with the usual descriptive statistical parameters. A total of 68 different tree species was recorded in the homestead, cropland and on the bank of pond of the study area of which Akashmoni, Jackfruit, Coconut, Mango, Neem, Eucalyptus and Bokain were dominant species. On an average 22.75 and 4 tree species were found in homestead and cropland area, respectively. Six selected characteristics of the farmers namely age, family size, farm size, homestead size, cultivable land size and annual income showed significant positive relationships with the diversity of tree species, while no such relationship was observed with education of the farmers.

Key words: Tree diversity, homestead and cropland agroforestry, Madhupur sal forest.

Introduction

Bangladesh is one of the fifty nine least developed countries in the world. It has very large population (14.71 crore) living in a very small geographical area (1,47,570 square km). The demand for food, shelter, fuel and fodder is rising at a geometric rate as jointly influenced by rapid population growth and increasing per capita consumption. As a result, the gap between actual demand and supply of the products is widening day by day.

Forests are vital for maintaining the earth's ecological balance. The accepted standard according to the experts of environmental science is that a country has at least 25 percent of its total land area covered with trees or forests (Huda and Roy, 1999). Once covered by dense forests, Bangladesh is now almost devoid of forested land, except in a few selected areas of the country (Giri and Shreshtha, 1996). In terms of per capita forestland, Bangladesh ranks amongst the lowest in the world, which is about 0.02ha per person (UNEP, 2002). According to the forestry Master plan (FMP) and surveys by multi-lateral donor agencies, a total of 7, 69,000 hectares or 6 percent of the country's land mass have actual tree cover (Huda and Roy, 2001). However, according to the Bangladesh Forest Department (BFD) the country now has about 7.7 percent of the land area under forest cover. Food and Agricultural Organization of the United Nations (FAO, 2003) reported higher statistics for forest cover in Bangladesh, which is 10.2 percent of the total land area. In any case, the area covered by forest is far below than the required level for maintaining ecological balance in Bangladesh.

Agroforestry is a collective name for all land use systems and technologies where woody perennials (trees, shrubs, palms, bamboo etc.) are deliberately grown on the same land management unit as agricultural crops and/or animals either in spatial mixture or in temporal sequence.

Homestead agroforestry is a traditional multi-storied farming system based on mixed cropping and/or livestock keeping. Cropland agroforestry indicates the simultaneous production of perennial trees and annual crops in cropland. The practice of cropland agroforestry is comparatively new. The Madhupur sal forest, the largest sal forest patch possesses a significant role in maintaining ecological balance situating at the center of the country. But unfortunately this forest area is severely denuded by local

people. Not only have mature trees been cut, illegal timber merchants have dug out stumps-leaving the areas barren without any regeneration potential (Chowdhury, 1999). More than 66 percent of the sal forest is blank or under the possession of encroachers at present (UNEP, 2002). For ecological balance tree coverage as well as tree diversity is an important consideration especially in the sal forest area. So, it is necessary to know the tree diversity situation in the forest areas of Bangladesh especially in the Madhupur sal forest area.

Materials and Methods

The study was conducted on the traditional sal forest area of Bangladesh located at Madhupur upazila of Tangail district. The data were collected from three villages (Lafula, Sathibari, Ranied) of Alokdia Union; three villages (Jalsatra, Joynathali and Konabari) of Ausnara Union and three villages (Gachhabari, Chunia, Pirgacha) of Arankhola Union under Madhupur upazila of Tangail district. Actually Madhupur sal forest is not confined in Madhupur upazila, but extends on large area of Madhupur tracts remaining under Tangail and Mymensingh districts. Madhupur tract is situated at 150 kilometers north of Dhaka. The Tangail-Mymensingh road passes through the forest. The study was limited on the remnant sal forest area lies on its presentative upazila Madhupur. A very small portion of the study area extended up to the Muktagacha and Fulbaria upazilas of Mymensingh district.

Geological Location of the Study Area: Madhupur is the most northern upazila of Tangail district. It is located $24^{\circ}47.08' N$ between $24^{\circ}31.12' N$ latitudes and $89^{\circ}51.65' E$ and $90^{\circ}9.66' E$ longitudes. The study areas were frequently visited during the period from 26 March to 9 April 2010.

Variable of the study: Independent variables of study area were (i) Age, (ii) Education, (iii) Family size, (iv) Farm size, (v) Homestead area, (vi) Cultivable land size, (vii) Number of tree species in homestead, (viii) Number of tree species in cultivable land or cropland, (ix) Number of tree species on the bank of pond, and (x) Annual income. Dependent variable of study area was tree species diversity.

Measurement of independent variables: Age of farmers refers to the period of time from his birth to the time of interview. A score of (1) was assigned for each year of his

age. It was measured in complete years as reported by a farmer. Education is defined as the ability of an individual to read and write, or formal education received up to ascertain standard. Education of a respondent was measured on the basis of classes he had passed in formal educational institution. For example, if a respondent passed class five, his education score was 5. If a respondent not knowing reading and writing was given a score of zero (0), and a score of 0.5 was assigned to these respondents who can sign only. The family size was measured by the total number of members in the family of a farmer. The family members included the farmer himself, spouse, children and other dependents. The information was obtained by a farmer's to item number 3 of the interview schedule. The total number of family members was considered as the family size score of a farmer.

Farm size of a respondent was measured in terms of hectares by using the followings formula: $Farm\ size = A_1 + A_2 + \frac{1}{2}(A_3 + A_4) + A_5$; Where, A_1 = Homestead area, A_2 = Own land under own cultivation, A_3 = Land taken from and/or given to other on borga, A_4 = Land taken from and/or given to other on lease, A_5 = Others (pond, fruit garden etc). Homestead area was measured by the area of the raised land in which the household has its entire living

room, livestock and poultry shed, yard under vegetables, fruit and timber trees, backyard, bushes, bamboo bunches, pond etc. It was express in hectare. Cultivable land size was measured by the land that was used for crop production and crop management through all the year round. It also includes the aspects that are used to produce human benefits by their intensive utilization. It was express in hectare. Number of tree species both in homestead and cultivable land was counted by number of tree species that are grown on these areas including fuel, wood, fodder, timber, fruit trees and it was express by numbers.

After completion of field survey data were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. Pearson's Product Moment Co-efficient of Correlation (r) was used in order to explore the relationship between the concerned variables.

Results and Discussion

Independent variables are presented in the Table 1. Age of the respondents ranged from 18 to 68 years with an average of 40.77 years. The highest proportion (41 percent) of the farmers was middle aged while 33 percent and 26 percent were young and old aged respectively.

Table 1. Basic statistical values of the selected characteristics (N = 100)

Characteristics	Measuring system	Observed range	Mean	Standard deviation
Age	Years	18 – 68	40.77	12.80
Education	Level of schooling	0 – 16	5.38	4.36
Family size	Numbers	2 – 12	6.08	2.28
Farm size	Hectare	0.09 – 6.45	1.21	1.31
Homestead size	Hectare	0.01 – 0.41	0.11	8.05
Cultivable land size	Hectare	0.03 – 6.14	1.04	1.21
Number of tree species in homestead	Numbers	6.0 – 48.0	22.75	13.10
Number of tree species in cultivable land	Numbers	.00 – 16	4.00	8.67
Number of tree species on the bank of pond	Numbers	.00 - 28	11.08	15.33
Annual income	Thousand	3900-190500	47983.85	47728.55

Education of the respondents ranged from 0 to 16 with an average of 5.38 Majority of the farmers (33 percent) were educated in primary level. The farmers of illiterate, secondary level and higher level were 21 percent 32 percent and 14 percent, respectively (Table 1).

Population size per family of the respondents ranged from 2 to 12 with an average of 6.08. Majority of the farmers (60 percent) were with medium (5-8) population while the small (up to 4) and large (above 8) families were 26 percent and 14 percent, respectively.

Farm size of the respondents ranged from 0.09 to 6.45 hectare with an average of 1.21 hectare. Majority of the farmers (44 percent) had small farm size. The landless and marginal, medium and large farm size was 15 percent, 28 percent and 13 percent, respectively (Table 1).

Homestead size of the respondents ranged from 0.01 to 0.41 hectare with an average of 0.11. Majority of the farmers (61 percent) was landless and marginal while the small, medium and large homestead size was with 29 percent, 6 percent and 4 percent farmers, respectively .

Cultivable land of the respondents ranged from 0.02 to 6.14 hectare with an average of 1.04. Majority of the farmers (63 percent) were landless and marginal cultivable

land size. The small, medium and large cultivable land sizes were 20 percent and 15 percent and 2 percent farmers, respectively (Table 1).

Tree diversity in the homestead area: Number of tree species in the homestead area ranged from 6 to 48 (Table 2) with an average value of 22.75 and standard deviation of 13.10. Out of 48 tree species Akashmoni, Jackfruit, Coconut, Mango, Neem, Eucalyptus, Bokain, Betelnut and Jujube were dominant in the homestead area (Table 2). The conducted study showed that 39 percent of the respondents grew up to 15 tree species, 28 percent grew 16 to 29 tree species, 22 percent of the respondents grew 30 to 40 tree species and 11 percent of the respondents grew above 40 number of tree species (Fig. 1).

Tree diversity in the crop land area: Number of tree species in cultivable land of the farmers ranged from 0 to 16 (Table 3) with an average value of 4 and standard deviation of 8.67. Out of 16 tree species Akashmoni, Jackfruit, Neem, Eucalyptus and Bokain were dominated in the cropland (Table 3).

Table 2. Tree species in homestead area

Sl. No	Local name	Scientific name	No. of Respondents
1	Akashmoni	<i>Acacia auriculiformis</i>	79
2	Kanthal	<i>Artocarpus heterophyllus</i>	85
3	Eucalyptus	<i>Eucalyptus camaldulensis</i>	82
4	Sirish	<i>Albizia lebbbeck</i>	35
5	Tal	<i>Borassus flabellifer</i>	36
6	Raintree	<i>Albizia saman</i>	37
7	Mingiri	<i>Cassia siamea</i>	30
8	Ipil-ipil	<i>Leucaena leucocephala</i>	34
9	Ashok	<i>Saraca indica</i>	30
10	Mander	<i>Erythrina orientalis</i>	29
11	Tentul	<i>Tamarindus indica</i>	49
12	Polash	<i>Butea monosperma</i>	34
13	Arjun	<i>Terminalia arjuna</i>	55
14	Am	<i>Mangifera indica</i>	80
15	Amloki	<i>Phyllanthus emblica</i>	49
16	Arboroi	<i>Phyllanthus acidus</i>	45
17	Jam	<i>Syzygium cumini</i>	63
18	Jamrul	<i>Syzygium samarengense</i>	45
19	Golapjum	<i>Syzygium jambos</i>	40
20	Neem	<i>Azadirachta indica</i>	65
21	Bokain	<i>Melia sempervirens</i>	77
22	Supari	<i>Areca catechu</i>	71
23	Narkel	<i>Cocos nucifera</i>	70
24	Litchi	<i>Litchi chinensis</i>	63
25	Boroi	<i>Zizyphus jujube</i>	67
26	Lebu	<i>Citrus limon</i>	63
27	Payera	<i>Psidium guajava</i>	64
28	Ataphal	<i>Annona reticulata</i>	57
29	Chalta	<i>Dillenia indica</i>	43
30	Mehogoni	<i>Swietenia macrophylla</i>	41
31	Segun	<i>Tectona grandis</i>	62
32	Joina	<i>Schleichera oleosa</i>	60
33	Kanchan	<i>Bauhinia acuminata</i>	33
34	Bakful	<i>Sesbania grandifolia</i>	36
35	Krishnachura	<i>Delonix regia</i>	38
36	Sonalu	<i>Cassia fistula</i>	22
37	Kadham	<i>Anthocephalus chinensis</i>	45
38	Bohera	<i>Terminalia bellerica</i>	7
39	Hortoki	<i>Terminalia chebula</i>	24
40	Pitraj	<i>Aphanamixis polystachya</i>	38
41	Sajna	<i>Moringa oleifera</i>	55
42	Bamboo	<i>Bambusa sp</i>	63
43	Bot	<i>Ficus bengalensis</i>	33
44	Hijal	<i>Baringtonia acutangula</i>	13
45	Jarul	<i>Lagerstroemia speciosa</i>	32
46	Simul	<i>Bombax ceiba</i>	27
47	Jalpai	<i>Elaocarpus floribundus</i>	55
48	Jiga	<i>Garuga piñata</i>	14

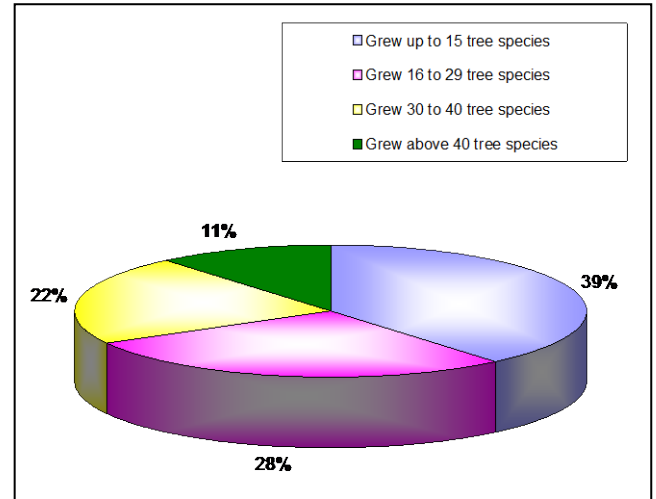


Fig. 1. Number of tree species in the homestead of each family

Table 3. Tree species in the crop land area

Sl. No	Local name	Scientific name	No. of Respondents
1	Akashmoni	<i>Acacia auriculiformis</i>	46
2	Bokain	<i>Melia sempervirens</i>	31
3	Neem	<i>Azadirachta indica</i>	27
4	Kanthal	<i>Artocarpus heterophyllus</i>	29
5	Litchi	<i>Litchi cinensis</i>	24
6	Am	<i>Mangifera indica</i>	23
7	Eucalyptus	<i>Eucalyptus camaldulensis</i>	25
8	Lebu	<i>Citrus limon</i>	20
9	Jhau	<i>Casuarina equisetifolia</i>	21
10	Segun	<i>Tectona grandis</i>	10
11	Ipil-ipil	<i>Leucaena leucocephala</i>	19
12	Mingiri	<i>Cassia siamea</i>	24
13	Sissoo	<i>Dalbergia sissoo</i>	23
14	Nilotica	<i>Acacia nilotica</i>	18
15	Acacia hybrid	<i>Acacia sp</i>	19
16	Gliricidia	<i>Gliricidia sepium</i>	20

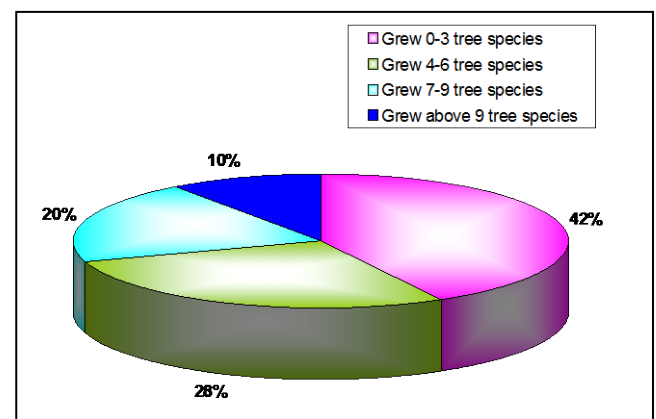


Fig. 2. Number of tree species in the crop land of each family

Though 16 species were found in cropland, 12 of them were common i.e. they were also found in homestead. The conducted study showed that 42 percent of the respondents grew up to 0 to 3 tree species, 28 percent grew 4 to 6 tree species, 20 percent of the respondents grew 7 to 9 tree species and the rest 10 percent grew above 9 tree species (Fig2).

Relationship between independent variables such as age, education, family size, farm size, homestead size, cultivation land size and annual income and tree diversity were estimated. Except education all independent variables showed significant positive correlation with tree diversity (Table 4).

Table 4. Relationship between independent variables and tree diversity

Farmer's characteristics	Computed value of 'r'	Tabulated value of 'r' at 98 degrees of freedom		
		5%	1%	0.1%
Age	0.276**			
Education	-0.053 ^{NS}			
Family size	0.238*			
Farm size	0.749***	0.197	0.257	0.325
Homestead size	0.595***			
Cultivable land size	0.711***			
Annual income	0.397***			

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