

## Study on Agroforestry and plant diversity in the char Gobadia of Mymensingh district

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**Abstract:** The study was conducted at Char Gobadia of Mymensingh Sadar upazila of Mymensingh district to determine plant diversity and its impact on livelihood improvement and to explore their relationships with the selected characteristics of the farmers of the study area. One hundred farmers were selected for the study. An interview schedule with simple technique and visual observation were used to determine the selected parameters. The respondents were selected randomly and used for collecting data during the period from 10 July to 25 August, 2011. Pearson's product moment correlation co-efficient ( $r$ ) was used for statistical analysis along with the usual descriptive statistical parameters. A total of 46 different plant species were recorded in the study area. The different categories of plants as 6 timber species, 6 medicinal species, 10 fruit species, 3 fuel species, 13 vegetable species and 8 crop species were recorded. Akashmoni, eucalyptus and jackfruit were the dominant timber species. In case of medicinal plants, neem, datura and basak were the dominant species. Among fruit species betelnut, coconut, jackfruit and mango were dominant. Bokain, goraneem and gamar were mainly used as fuelwood plant species. Among the crop species bittergourd, bottle gourd, country bean, okra are dominant species. Chilli, jute, maize are dominant crop species. The respondents of Char Gobadia gave much priority on mahogoni, lambu, karanja and eucalyptus as timber plant species and regarding fruit plant they gave much priority to mango, lemon, guava, papaya, appel-kul, BAU-kul. For vegetable cultivation they prefer bottle gourd, radish, tomato, sweet gourd and for crop chilli, jute and rice. Average numbers of plant species/family and plant density were found 12.33 & 0.265 respectively. The relationship between the plant diversity and the selected characteristics showed that only family size and age has no significant relationship with plant diversity. Education, total land area, annual income, knowledge on agroforestry and knowledge on tree has direct relationship with plant diversity.

**Key words:** Plant diversity, plant species, Agroforestry, char area, plant density.

### Introduction

Bangladesh, the most densely populated country of the world, possess about 142,319 thousands people in its area of 147570 km<sup>2</sup> with more than 964 persons per km<sup>2</sup>. There is 8.29 million hectare of cultivable land and about 19710 km<sup>2</sup> of forest in Bangladesh. About 85% of population lives in the rural area in 32,067,700 households spreading over 87505 villages (BBS, 2011). The addition of population per year is 1,772 thousands with an annual growth rate 1.34%. Agriculture is the foundation of the country, which contributes about 23.50% to the gross domestic product (GDP) (BBS, 2011).

Vegetation cover is continuously reduced due to utilization of forest and agricultural lands for other purposes. Depletion of forest has resulted in loss of biodiversity, global climate change, degradation of water sheds and desertification (Abedin and Quddus, 1990). Present reduction trends in agricultural and forest land may be compensated through the practices of agroforestry. Consequently, the agricultural landscapes become increasingly important frontiers for biodiversity conservation and livelihood provisioning.

In Bangladesh scope of agroforestry is vast. The main venues of agroforestry are homestead, roadside, railway side, embankment side, pond side, charland, coastal area, deforested area, institutional premises, riverside, canal side etc. Among them charland is the most important venue for practicing agroforestry systems in Bangladesh. The major char inhabited districts of Bangladesh are Jamalpur, Mymensingh, Sirajgonj, Noakhali, Bogra, Rangpur, Bhola and Patuakhali. In Mymensingh district there are 12 upazilas of which Mymensingh sadar, Ishwarganj, Trishal, Gaffargaon and Gouripur upazila are char inhabited area containing about 584 sq. km charland areas. These five upazilas contained atleast 361000 homesteads of which 25 per cent i.e. 90000 homesteads remained in char areas (BBS, 2006). A huge land recovered from this riverbed for hundred years as named

'CHARS' is big part of Mymensingh. A large number of populations are living in these char areas and maintaining

their livelihood through char based farming systems. In the char areas, more than 60 per cent people do not own any cultivated land other than the homestead only. Therefore, for improving the livelihood of the charland people, increase of productivity of land with introducing tree species in their charland by the association with crops and vegetables as Agroforestry practices is prime requirement. Therefore present study observed the plant diversity, Agroforestry systems and its impact on the livelihood improvement of the farmers of char Gobadia areas of Mymensingh district.

### Materials and Methods

**Location of the study area:** Keeping in view all the objectives of the study and considering the limitations on the research with respect to time, manpower and other facilities Mymensingh Sadar is located at 24°45'00"N 90°25'00"E. Char Gobadia is situated in 6 no. char Ishurdia of Mymensingh Sadar Upazila (Fig. 1). The total area of Gobadia is 3,650 km<sup>2</sup>. Total number of population is 4680 where 2321 are male and 2259 are female.

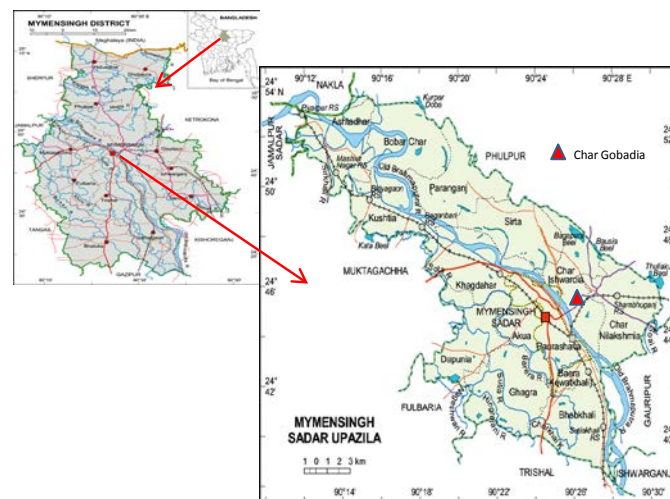


Fig. 1. Location of the study area

**Population and sampling procedure:** Data has been collected from a sample rather than whole a bunch of people involved considering the limitation of time, money, and energy. The Agroforestry practicing people of Gobadia constituted the populations for the study. A sample of 100 farmers has been elected following a multistage random sampling procedure. In the first step one union from Mymensingh Upazila i.e., one char area is selected by using table of random numbers. In the second step the Agroforestry practicing farmers were enlisted for the selected area. There were altogether 100 farmers selected as sample size for this study.

**Preparation of survey schedule:** In conformity with the set objectives of the study, a set of preliminary interview schedules/questionnaire has been designed for collection of data for the study. The interview schedule/questionnaire had been carefully designed in such a way that all factors associated with the economic organization and performance of the fat-in business could be included. Simple questions and/or statements regarding the n-basic factor were included in the schedule. The draft schedule has been pre-tested 1) interviewing some sample farmers of Char Gobadia in Mymensingh Sadar Upazila by the researcher himself. Thus, the final survey schedule has been prepared in a simple manner maintaining logical sequences and necessary adjustments.

**Variables of the study:** Two types of variables are observed in this study viz., independent and dependent variables. Independent variables were farmer characteristics represent the independent variable in this study. Total seven characteristics of farmers selected for this study as independent variable which are as: age, education, family size, farm size, annual income, knowledge about tree and knowledge about Agroforestry. Dependent variable is plant species diversity treated as dependent variable of the study.

**Data collection and processing:** To get valid and pertinent information, the researcher made all possible effort to explain the purpose of the study to the respondents. The help of leader farmers made appointments with the interviewer in advance. The researcher administered the interview schedule personally to the respondents. Rapp on has been established with the respondents though informal discussion regarding objectives of the interview. Co-operation has been obtained from respondents during data collection; Data were collected from 10 July to 25 August, 2011. Data collected from the respondents (samples) has been verified, compiled, tabulated and analyze statistically according to the objectives of the study. In some cases, qualitative data has been converted into quantitative data by means of suitable scoring to facilitate interpretation

**Analysis of data:** After data collection, those has been compiled, tabulated, and analyzed statistically in accordance with objectives of the study. Qualitative data has been converted into quantitative one by means of suitable scoring techniques wherever necessary. Descriptive statistics such as number and percentage, range, frequency count, mean, standard deviation and rank order has been used in describing variables of the study. Pearson's product moment correlation co-efficiency (r) has been used in order to explore the relationship between the concern variables.

## Results and Discussion

### Characteristics of the respondents

Eight characteristics of the farmers were investigated viz age, education level, family size, total land area, annual income, number of plants in homestead and Char, knowledge about trees and knowledge about Agroforestry. Measuring system of the each characteristic, their observed range, mean and standard deviation are presented in the Table 1.

**Table 1.** Description of farmer's characteristics treated as independent variables of the study (N=100)

Characteristics	Measuring System	Observed Range	Mean	Standard deviation
Age	Years	30-67	47.00	9.6
Education level	Level of schooling	0-12	1.52	.73
Family size	Numbers	4-10	5.88	1.29
Total land area	Hectare	0.03-0.6	0.206	0.131
Annual income	Thousand (Tk.)	25000-110000	45650.39	17682.5
Number of plants in Homestead and char	Number	10-50	20.17	6.791
Knowledge on Agroforestry	Scale score	10-50	10.13	8.7601
Knowledge on Tree	Scale score	20-80	71.1	14.225

**Plant species diversity:** Total of 48 different plant species were recorded in the Char Gobadia area of Mymensingh of which 7 timber species, 6 medicinal species, 10 fruit species, 4 fuel species, 13 vegetable species and 8 crop species (Table 2). Akashmoni, eucalyptus, jackfruit are the dominant timber species; Neem, datura, basak are the dominant medicinal species; betelnut, coconut, jackfruit, mango are dominant fruit species; Bokain, goraneem and gamar are mainly used as fuelwood plant species and bittergourd, bottol gourd, country bean, okra, chilli, jute, maize are dominant vegetables/crops species. Diversify plant species also observed by Belali (2011) in the

Narayangonj district and Sabuj *et al.* (2010) in the Natore district. Belali (2011) observed total 78 plant species of which Eucalyptus, Akashmoni, Mehogoni wer dominant species and Shabuj *et al.* (2010) reported that Eucalyptus, Akashmoni, Mehogoni, Raintree, Sissoo were dominant.

**Plant density:** Plant density was measured for Char Gobadia per 10m<sup>2</sup> area was 0.265. In Char Gobadia, plant density was observed in different farm size as small, medium and large were 0.233, 0.245, and 0.317 respectively and average numbers of plant species/family and plant density/10m<sup>2</sup> were 12.33 and 0.265 respectively (Table 3).

**Table 2.** Plant species observed in the Char Gobadia area of Mymensingh

Sl. No.	Name	% farmers possessing
Timber		
1	Akashmoni ( <i>Acacia auriculiformis</i> )	85
2	Eucalyptus ( <i>Eucalyptus sp</i> )	80
3	Jackfruit ( <i>Artocarpus heterophyllus</i> )	95
4	Kalo koroi ( <i>Albizia lebeck</i> )	60
5	Sissoo ( <i>Dalbergia sissoo</i> )	55
6	Gamar ( <i>Gmelina arborea</i> )	65
7	Raintree ( <i>Albizia saman</i> )	65
Medicinal		
8	Basak ( <i>Adhatoda vasica</i> )	60
9	Datura ( <i>Datura metal</i> )	60
10	Khoir ( <i>Acacia catechu</i> )	60
11	Neem ( <i>Azadirachta indica</i> )	90
12	Simul ( <i>Bombax ceiba</i> )	50
13	Tulsi ( <i>Ocimum americanum</i> )	75
Fruit		
14	Amra ( <i>Spondis pinnata</i> )	40
15	Bel ( <i>Aegle marmelos</i> )	50
16	Betelnut ( <i>Areca catechu</i> )	80
17	Black berry ( <i>Syzygium cumini</i> )	65
18	Coconut ( <i>Cocos nucifera</i> )	75
19	Guava ( <i>Pisidium guajava</i> )	50
20	Jackfruit ( <i>Artocarpus heterophyllus</i> )	75
21	Jujube ( <i>Zizyphus jujube</i> )	55
22	Mango ( <i>Mangifera indica</i> )	65
23	Tal ( <i>Borassus spp.</i> )	35
Fuel		
24	Bokain ( <i>Melia sempervirens</i> )	70
25	Goraneem ( <i>Melia azadarach</i> )	85
26	Krishnochura ( <i>Delonix regia</i> )	45
27	Tentul ( <i>Tamarindus indica</i> )	65
Vegetables		
28	Bitter gourd ( <i>Momordica charantia</i> )	100
29	Bottle gourd ( <i>Lagenaria ciceraria</i> )	75
30	Brinjal ( <i>Solanum melongena</i> )	60
31	Country bean ( <i>Lablab purpureus</i> )	75
32	Indian spinach ( <i>Basella alba</i> )	75
33	Kachu ( <i>Calocasia spp</i> )	60
34	Okra ( <i>Abelmoschus esculentus</i> )	75
35	Radish ( <i>Raphanus sativus</i> )	40
36	Red amaranth ( <i>Amaranthus mangostanus</i> )	20
37	Snake gourd ( <i>Trichosanthes anguina</i> )	30
38	Sweet gourd ( <i>Cucurbita moschata</i> )	60
39	Teasle gourd ( <i>Momordica cochinchinensis</i> )	60
40	Wax gourd ( <i>Benincasa hispida</i> )	20
Crops		
41	Chilli ( <i>Capsicum spp.</i> )	85
42	Jute ( <i>Cochorus spp.</i> )	75
43	Maize ( <i>Zea mays</i> )	75
44	Mustard ( <i>Brassica spp.</i> )	60
45	Potato ( <i>Solanum tuberosum</i> )	40
46	Pulse ( <i>Vigna mungo</i> )	50
47	Rice ( <i>Oryza sativa</i> )	60
48	Wheat ( <i>Triticum aestivum</i> )	50

**Table 3.** Plant density in the study area

Farm size	Average no. of plant species	Average farm size( m <sup>2</sup> )	Plant density(plant/10 m <sup>2</sup> )
Small	7	300	0.233
Medium	11	450	0.245
Large	19	600	0.317
Total avg.	12.33	417.33	0.265

**Relationship between dependent and independent variables:** To explore the relationship between dependent and independent variables, Pearson's product moment coefficient of correlation (r) has been used (Cohen and Holiday, 1982). Five characteristics of the farmers namely; education, family size, total land area, annual income, knowledge about trees & knowledge about Agroforestry

showed significant positive relationships with the diversity of tree species, while no such relationship was observed with age and family size (Table 4). Similar relationship also found by Yasmin *et al.*, (2010) in the Tangail district, and Jahan (2010) in the Kishorgonj district between the different characteristics of farmers and plant species diversity.

**Table 4.** Relationship between dependent and independent variables in char Gobadia

Farmer's characteristics	Computed values of r	Tabulated value of r (5% level)
Age	0.040 NS	
Education	0.542**	
Family size	0.112 NS	
Total land area	0.503**	0.319
Annual income	0.375**	
Knowledge on Agroforestry	0.600**	
Knowledge on Tree	0.426**	

\*\*Correlation significant at the 0.05 level, NS -Non significant

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