

HOMESTEAD AGROFORESTRY SYSTEMS PRACTICED AT KAMALGANJ UPAZILA OF MOULVIBAZAR DISTRICT IN BANGLADESH

ABSTRACT

This study was conducted at Kamalganj Upazila of Moulvibazar District in Bangladesh during January to September 2015 to observe the diversity of plant species in the homestead area with their stratified arrangement to identify homestead agroforestry practices and their relationships with the selected properties of the respondents. Face to face interview was performed with 135 respondents to collect the data with the help of questionnaire. Existing in homestead area, the result demonstrated that a total of 29 different agroforestry practices and 6 different vertical layers were recorded in the homestead area. Out of different categories of plant species, 40 timber, 25 fruits and 23 medicinal and other plants were recorded. Total twenty-nine different Agroforestry combinations were recorded namely: 1. Ginger-Areca nut, 2. Coconut-Betel nut-French bean-Cabbage, 3. Areca nut-Mango-Banana-French bean, 4. Banana-Eucalyptus, 5. Areca nut-Country bean-Cauliflower, 6. Mango-Banana-Sweet gourd-Cauliflower, 7. Banana-Koroi-Brinjal-Papaya-Coconut, 8. Jackfruit-Chili, 9. Eucalyptus-Papaya-Chili, 10. Acasia-Country bean-Taro, 11. Jackfruit-Betel nut, 12. Turmeric-Eucalyptus, 13. Lemon-Coconut, 14. Tomato-Mehogoni, 15. Sugarcane-Papaya-Country bean-Areca nut, 16. Aquaculture-Mangium, 17. Aquaculture-Aasia hybrid, 18. Aquaculture- Koroi, 19. Aquaculture-Mango, 20. Aquaculture-Banana-Acasia(hybrid)-Blackberry, 21. Aquaculture-Koroi-Eucalyptus-Ber-Areca nut, 22. Aquaculture-Chalta-Bamboo, 23. Turmeric-Koroi, 24. Turmeric-Areca nut, 25. Areca nut-Betel leaf, 26. Coconut-Country bean, 27. French bean-Acasia hybrid, 28. Turmeric-Acasia hybrid, 29. Aquaculture-Acasia hybrid were found in the study area. Among the classes of agroforestry systems agrosilviculture was found most common (about 62%).

Keywords: Homestead agroforestry, diversity of plant, agrosilviculture, silvoagriculture, Kamalganj Upazila, Ethnobotany.

1. INTRODUCTION

Homestead Agroforestry plays a vital role in the economy of Bangladesh. Trees and other woody species grown in the homesteads are significant source of food, fodder, fuel and timber. Most of the vegetable produced in the country are coming from the homesteads [1]. There are about 25.49 million of homesteads in our country covers about 0.80 million ha of lands [2]. Trees in the homesteads, often called homestead forests, play an important role in rural economy as well as national economy of Bangladesh [1]. Homestead farming is getting importance as the way of investing minimum capital but earning maximum income with increased participation of respondents in economic activities. Homestead agroforestry may contribute to uplift the socio-economic condition of the respondents, supply fuel wood, give protection from hazards, provide food and other benefits etc. Majority of the respondents cultivates their homesteads by different fruit and timber species in unplanned way. So, exploration of existing timber and fruit tree species adaptive with changing climatic condition is needed first to have a clear understanding of the homegardens. Adaptability of a species and its suitability to a site is indicated by its frequency and growth [3].

For this above situation i.e. increased population and deforested condition, agroforestry practices especially in the homestead area will be an appropriate alternate land management option. Agroforestry is the combination of forestry and agriculture with the attributes of productivity, sustainability and adoptability. Agroforestry can provide sound ecological basis for increased crop and

animal productivity, more dependable economic returns and greater diversity in social benefits on sustained basis [4]. Homestead agroforestry consisting of an assemblage of plants which includes trees, shrubs, and herbaceous plants, growing in the homestead area has a long tradition in the study site. These are planted and maintained by the household members for products intended to household consumption; they have considerable ornamental value and provide shade to people and animals [5].

Homestead is one of the elaborate systems of indigenous Agroforestry, mostly found in tropical and sub-tropical areas where subsistence land uses system is predominate. It can be defined as the land surroundings a house on which a mixture of annual and perennial plants are grown together with or without animals largely managed by the household members for their own used or commercial purposes [6]. According to Nair (1993) the term homestead agroforestry means anything for growing vegetables behind house to complex multistoried systems [7]. They defined it as a land use practices involving deliberate management of multipurpose trees and shrubs in intimate association with annual and perennial agricultural crops and invariably livestock within the compounds of individual houses, and the whole crop, tree are being intensively managed by family labor [8]. In Bangladesh homestead agroforestry is referred to as 'Bosotvita Bagan' and is commonly considered as a small-scale enterprise established and maintained for household consumption, with additional household income through the sales of produce and environmental services [9]. They constitute the most important source of wood, bamboo and other non-timber forest products in the country; attaining 15 to 25 times greater productivity than government administered forest lands [10]. Hence, homegardens in Bangladesh may act as refuges for many native and rare plants [8].

2. MATERIAL AND METHODS

2.1. Physiography and Climate

Eastern and western parts of this upazila are hilly mountains and most of this part is covered with forest. An old human habitation is developed in plain land of eastern part of upazila. The highest peak of mountain is 500 feet high located in the south verge. The climate is warm and temperate. When compared with winter, the summers have much more rainfall. The average annual temperature is 24.8 °C in Kamalganj. About 2564 mm of precipitation falls annually. During December to February weather becomes dry, rainfall turns to 50.8 mm and in June, the precipitation reaches its peak. From March to May temperature increases with the humid weather [11].

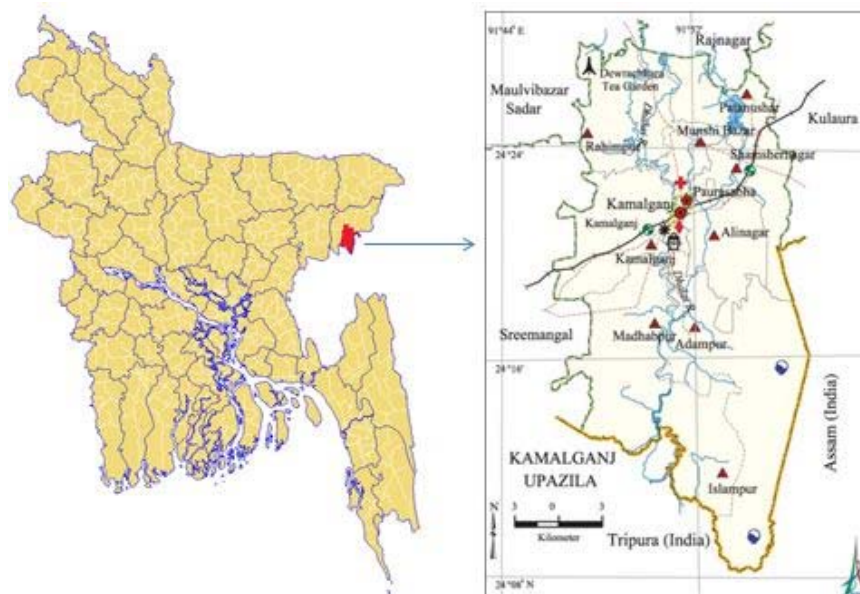


Figure: Geographical location of the studied area in Bangladesh

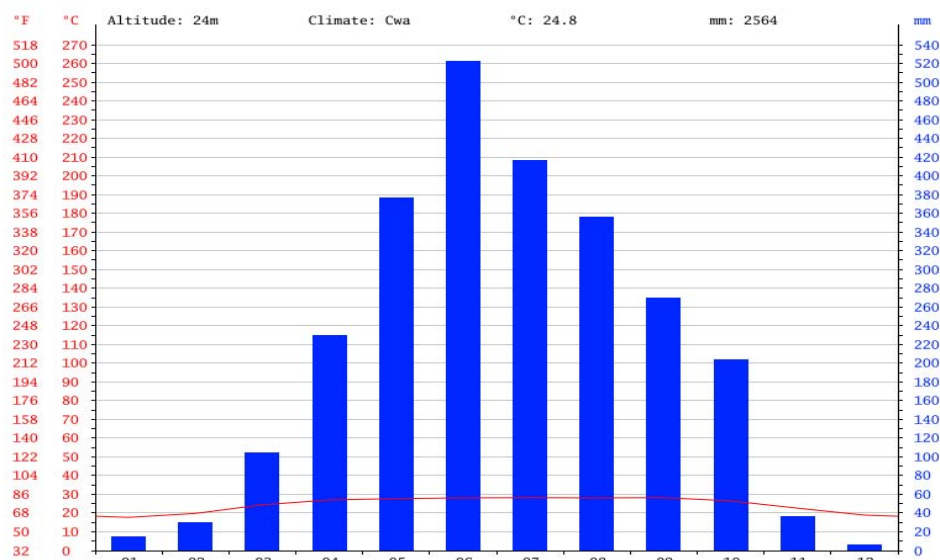


Figure 2: Climogram showing temperature and rainfall differences

2.2. Period of data collection

To get valid information the researcher made all possible effort to explain the purpose of the study to the respondents. Co-operation was obtained from respondents during data collection. Data were collected from a total of 135 respondents during January to September, 2015.

2.3. Preparation of survey schedule

In order to collect relevant information from the respondents a set of preliminary survey schedules was used. The questionnaire was carefully designed keeping the objective of the study in mind. The questionnaire contained both open and closed form questions. Thus, the final questionnaire was prepared on the basis of valid suggestions, logical sequences and comment of the research supervisor.

2.4. Method of data collection

Data were collected by using the individual questionnaire. Total 135 respondents are randomly selected from each union. Before going to make interview, each respondent was given a brief introduction about the nature and purpose of the study and the researcher assured them that, all information would be kept confidential. The collected data was verified through surveying the villages and personal interview with the sample respondents. Interviews were normally conducted in respondents' house in their leisure time and even in the field when they worked in the field. After the completion of each interview, each questionnaire was checked to be sure that information to each of the items had been properly recorded.

2.5. Data processing and analysis

After completion of collecting data from all the interview schedules were coded, compiled, tabulated and analyzed in accordance with objectives of the study. The responses to the questions in the interview schedules were transferred to master sheet to facilitate tabulation for describing the different characteristics and their constraint facing, the respondents were classified into several categories. MS Excel was used for Data processing and analysis.

3. RESULTS AND DISCUSSION

3.1 Existing Agroforestry Practices

The diversity of trees, crops and vegetables in the study area was found as rich level. As a result different combination or mixed association of tree and vegetable was found in the study area. According to the respondents' opinion a total of 29 different agroforestry systems were recorded in the

99 study area (Table 1). Rashid *et al.* (2007) found eleven different traditional agroforestry practices in
 100 Pabna district [12]. Three classes of agroforestry systems were found in the study area.
 101 Agrosilviculture was found most common class of agroforestry system and it's about 62%. Based on
 102 the result of this study it will be easy to conduct more research work to find the ecological and
 103 economical importance of the existing agroforestry systems.

104 Table 1: Existing Agroforestry systems practiced in the study area.

Unions	Existing Agroforestry systems	Classes of agroforestry systems
Kamalganj	1. Aquaculture–Mangium (<i>Acacia mangium</i>)	Aquasilvoculture
	2. Betel leaf (<i>Piper betle</i>)–Areca nut (<i>Areca sp.</i>)	Agrosilviculture
	3. Coconut (<i>Cocos sp.</i>)–Betel nut (<i>Areca sp.</i>)–French bean (<i>Phaseolus vulgaris</i>)–Cabbage (<i>Brassica sp.</i>)	Agrosilviculture
	4. Areca nut (<i>Areca sp.</i>)–Mango (<i>Mangifera indica</i>)–Banana (<i>Musa sp.</i>)–French bean (<i>Phaseolus vulgaris</i>)	Agrosilviculture
	5. Banana (<i>Musa sp.</i>)–Eucalyptus (<i>Eucalyptus globulus</i>)	Silvoagriculture
Alinagar	1. Ginger (<i>Zingiber officinale</i>)–Areca nut (<i>Areca sp.</i>)	Agrosilviculture
	2. Areca nut (<i>Areca sp.</i>)–Country bean (<i>Lablab sp.</i>)–Cauliflower (<i>Brassica oleracea var. botrytis</i>)	Agrosilviculture
	3. Mango (<i>Mangifera indica</i>)–Banana (<i>Musa sp.</i>)–Sweet gourd (<i>Lagenaria sp.</i>)–Cauliflower (<i>Brassica oleracea var. botrytis</i>)	Agrosilviculture
	4. Aquaculture–Acasia hybrid (<i>Acasia sp.</i>)	Aquasilvoculture
	5. Aquaculture–Koroi (<i>Albizia sp.</i>)	Aquasilvoculture
	6. Banana (<i>Musa sp.</i>)–Koroi (<i>Albizia sp.</i>)–Brinjal (<i>Solanum melongena</i>)–Papaya (<i>Carica papaya</i>)–Coconut (<i>Cocos sp.</i>)	Agrosilviculture
	7. Acasia hybrid (<i>Acasia sp.</i>)–Country bean (<i>Lablab sp.</i>)–Taro (<i>Colocasia sp.</i>)	Agrosilviculture
	8. Jackfruit (<i>Artocarpus heterophyllus</i>)–Betel nut (<i>Areca sp.</i>)	Silvoagriculture
Islampur	1. Ginger (<i>Zingiber officinale</i>)–Areca nut (<i>Areca sp.</i>)	Agrosilviculture
	2. Turmeric (<i>Curcuma longa</i>)–Acasia hybrid (<i>Acasia sp.</i>)	Agrosilviculture
	3. Banana (<i>Musa sp.</i>)–Eucalyptus (<i>Eucalyptus globulus</i>)	Agrosilviculture
Patanushar	1. Aquaculture–Banana (<i>Musa sp.</i>)–Acasia hybrid (<i>Acasia sp.</i>)–Blackberry (<i>Rubus sp.</i>)	Aquasilvoculture
	2. Betel leaf (<i>Piper betle</i>)–Areca nut (<i>Areca sp.</i>)	Agrosilviculture
Adampur	1. French bean (<i>Phaseolus vulgaris</i>)–Acasia hybrid (<i>Acasia sp.</i>)	Silvoagriculture
	2. Turmeric (<i>Curcuma longa</i>)–Areca nut (<i>Areca sp.</i>)	Agrosilviculture
	3. Country bean (<i>Lablab sp.</i>)–Coconut (<i>Cocos sp.</i>)	Agrosilviculture
	4. Jackfruit (<i>Artocarpus heterophyllus</i>)–Chili (<i>Capsicum annuum</i>)	Agrosilviculture
	5. Eucalyptus (<i>Eucalyptus globulus</i>)–Papaya (<i>Carica papaya</i>)–Chili (<i>Capsicum annuum</i>)	Agrosilviculture
Madhabpur	1. Aquaculture–Mango (<i>Mangifera indica</i>)	Aquasilvoculture

Unions	Existing Agroforestry systems	Classes of agroforestry systems
	2. Aquaculture–Chalta (<i>Dillenia indica</i>)–Bamboo	Aquasilvoculture
	3. Turmeric (<i>Curcuma longa</i>)–Eucalyptus (<i>Eucalyptus globulus</i>)	Silvoagriculture
	4. Areca nut (<i>Areca sp.</i>)–Turmeric (<i>Curcuma longa</i>)	Silvoagriculture
Shamshernagar	1. Aquaculture–Koroi (<i>Albizia sp.</i>)–Eucalyptus (<i>Eucalyptus globulus</i>) –Ber (<i>Ziziphus mauritiana</i>)–Areca nut (<i>Areca sp.</i>)	Aquasilvoculture
	2. Betel leaf (<i>Piper betle</i>)–Areca nut (<i>Areca sp.</i>)	Agrosilviculture
Rahimpur	1. Lemon (<i>Citrus sp.</i>)–Coconut (<i>Cocos sp.</i>)	Agrosilviculture
	2. Aquaculture–Acasia hybrid (<i>Acasia sp.</i>)	Aquasilvoculture
Munshibazar	1. Turmeric (<i>Curcuma longa</i>)–Koroi (<i>Albizia sp.</i>)	Silvoagriculture

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107 (a) Coconut-Betel nut-French bean-Cabbage

(b) Areca nut-Mango-Banana-French bean



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109 (c) Areca nut-Country bean-Cauliflower

(d) Mango-Banana-Sweet gourd-Cauliflower



(g) Acasia-Country bean-Taro

(h) Ginger-Betel nut

Plate 1. Different agroforestry practices observed in the homestead area of Kamalganj Upazila of Moulvibazar District.

3.2 Benefits from homestead agroforestry

According to respondents' opinion shade was ranked as the highest benefit followed by daily need (fruits, vegetables, fuel wood) as second and cash income was ranked as third benefit. The other benefits were nutrients, protection, soil erosion control and N-fixation (Table 2).

Table 2 Benefits from homestead agroforestry

Sl. No.	Benefits	Ranking
1	Shade	1
2	Daily need (Fruits, vegetables, fuel wood)	2
3	Cash income	3
4	Nutrients	4
5	Protection	5
6	Soil erosion control	6
7	N-fixation	7

4. CONCLUSION

A total of 29 different combinations were recorded as different Agroforestry practices in the studied area which was promising in respect of productivity/income of the respondents and socio-economic conditions of the respondents of the study area. Among the classes of agroforestry systems agrosilviculture was found most common (about 62%). Selection of the species for agroforestry classes practiced by the respondents mainly based on their family demand.

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