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Evaluation of management practices and magnitude of different problems in Haor homestead fruit cultivation in Bangladesh

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Abstract

A study was conducted in Haor area of Ajmiriganj upazila of Habigonj district. There are five unions in Ajmiriganj upazila. The 45 homesteads were surveyed to understand their knowledge regarding homestead fruit cultivation and also identify the present fruit production system. A well structured interview schedule was developed based on objectives of the study. The majority (42.22%) of the fruit growers belongs to the low knowledge category, while only (20.00%) in high knowledge. Level of education, annual income and size of homestead fruit trees area showed significant positive relationship with knowledge of homestead fruit management, whereas age showed significantly negative relationship with knowledge. The findings revealed that the people of Haor areas in Bangladesh have lower knowledge on management of homestead fruit production and practices. Lack of technical knowledge about materials is the 1st category problem in fruit cultivation followed by high rate of interest and adequate loan demand and also inadequacy and high price of inputs, while interference of middle man to get loan, shortage of cold storage is the more manageable problems regarding to increases of homestead fruit production in Haor areas.

Keywords: Haor areas, homestead, fruit cultivation, fruit production, problems

Introduction

Homestead refers to home and adjoining land occupied by a family to cultivate some crops for their own consumption and marketing. There are 32.07 million homesteads in Bangladesh and over 74% of the population lives in the rural areas. Approximately 7% area (0.53 million hectare) of the total 8.4 million hectare of cultivable land in Bangladesh is occupied by homesteads which is extremely productive (BBS, 2011) [5]. Homesteads play a vital role in providing timber, fuel wood, fodder, and fruits. Record of 70% of timber, 90% of fuel wood, 48% sawn and veneer logs and almost 90% of bamboo requirement is available from home gardens of Bangladesh (Uddin *et al.*, 2002) [21]. Villages of Bangladesh have a long heritage of growing fruit trees along with other perennial shrubs and herbs (Rahman *et al.*, 2009) [17]. Homesteads represent a land use system involving deliberate management of multipurpose trees and shrubs in limited association with seasonal vegetables (Fernandes and Nair, 1986) [7]. In Bangladesh, homestead gardens represent a well-established traditional land use system where natural forest covers less than 10%; homestead gardens, which are maintained by at least 20 million households, represent one possible strategy for biodiversity conservation (Zashimuddin 2004; Kabir and Webb, 2008) [23, 10]. The conservation of cultivated plants in homestead gardens of Bangladesh not only preserves a vital resource for humankind but plays an important role in household food security, as it is a sustainable source of food, fruits and vegetables (Uddin and Mukul, 2007) [20]. Several studies showed that species diversity in a homestead garden can range from less than five (Abdoellah, *et al.*, 2006) [1] to more than 100 (Vogl and Vogl-Lukasser, 2003) [22]. In Bangladesh, various studies explore the floristic composition in the homestead gardens, agroforestry system, homestead plantation and traditional uses, quantitative structure and silvicultural management; production and services (Millat-E-Mustafa, 2002 and Motiur, *et al.*, 2005) [14, 16]. Bangladesh abounds with a large variety of tropical and sub-tropical fruits (Abdoellah, *et al.*, 2006; Akhter *et al.*, 2010) [1, 3].

The most widely cultivated fruits are Mango, Jackfruit, Black berry, Pineapple, Banana, Litchi, Lemon, Guava, Hog plum, Custard apple, Wood apple, Elephant apple, Golden apple, Indian berry, papaya, Coconut, Tamarind, Melon, Watermelon, Cashew nut, Pomegranate, Palmyra, Plum, Rose apple, Indian olive, and Indian jujube. There are many minor edible fruits that are locally available in the wild and are also cultivated, such as latkan, monkey jack, uriam, rattan, river ebony, garcinia, wild date palm, etc. In Bangladesh, there is no specific management plan for the homestead fruit trees which are being traditionally managed by the household owners (FAO, 2010). The management of the traditional homestead garden has evolved as a response to many factors such as cultural, economic and environmental as well as personal preferences (Motiur *et al.*, 2006; Southern, 1994) ^[15, 19]. Millat-E-Mustafa *et al.* (1996) ^[13] recorded eight major uses of the homestead forest plants: fruit/food, timber, firewood, spice, fodder, medicine, fencing, and miscellaneous. The miscellaneous uses include brooms, handicrafts, shade, ornamental, ceremonial, environmental, and aesthetic. Again, the ecological merits of homestead garden are related to conservation of soil, water, nutrients, and biodiversity (Masum, *et al.*, 2008) ^[12]. Although Haor homestead is different from the main land but it has enough space for fruit production and some other household intervention. Considering the importance of Haor areas homestead fruit production both from economic and nutritional point of view the study was conducted to identify the different interrelated characteristics of the fruit growers that influence their knowledge on the management practices for homestead fruit cultivation in Haor homestead of Bangladesh.

Materials and Methods

The study was conducted in Ajmiriganj upazila under Habigonj district and it was a Haor area. Through a survey under the project BAS-USDA-PALS an update list of 45

family were made who have the fruit trees of Mango, Hog plum, Papaya, Banana, Orange, Lemon, Jujube, Coconut, Guava, Star fruit, Pummelo, Sapota and Wax apple in their homestead areas. Thus, 45 homestead fruit growers constituted the sample of the study. A well structured interview schedule was developed based on objectives of the study. The independent variables were: age, level of education, family size, annual income, age of homestead, size of homestead and size of homestead fruit trees area. The dependent variable of this study was the knowledge on management of homestead fruit production and practices. The researcher himself collected the data from the sample respondents fruit grower through personal contact with the help a pre-tested interview schedule. Data collection was started in October, 2013 and completed in November, 2013. Various statistical measures such as frequency counts, percentage distribution, average, and standard deviation were used in describing data. SPSS (version 11.5) computer program were used for analyzing the data.

Results and Discussion

Characteristics of the Fruit Growers

There are different interrelated characteristics of the fruit growers that influence their knowledge on the management practices for homestead fruit cultivation in Haor homestead of Bangladesh. It was therefore, hypothesized that the characteristics of the fruit growers would have an effect on the homestead farming knowledge of fruit growers. However, the most important features of seven selected characteristics of the homestead fruit growers in Haor homestead of Bangladesh such as age, level of education, family size, annual income, age of homestead, size of homestead and size of homestead fruit trees area. Character wise summary of descriptive statistics of homestead fruit growers in Haor area of Bangladesh are presented in Table 1 and Summary distribution of the respondents according to their selected characteristics are presented in Table 2.

Table 1: Descriptive statistics of homestead fruit growers in *Haor* area of Bangladesh

| Characteristics | Measuring unit | Observed range | Mean | Standard deviation |
|--|----------------|----------------|-------|--------------------|
| Age | Years | 26-60 | 47.22 | 8.93 |
| Level of education | Schooling year | 0.0-14 | 4.26 | 4.68 |
| Family size | Numbers | 2.0-6.0 | 4.18 | 1.11 |
| Annual income | Amount | 56-260 | 123.5 | 46.67 |
| Age of homestead | Years | 8-40 | 26.40 | 9.84 |
| Size of homestead area | Hectare | 0.08-0.56 | 0.248 | 0.134 |
| Size of homestead fruit trees area | Hectare | 0.03-0.38 | 0.115 | 0.08 |
| Number of livestock in homestead | Number | 3-21 | 10.24 | 4.11 |
| Knowledge on management of homestead fruit cultivation | Score | 10-64 | 28.36 | 15.98 |

The score of age of the homestead fruit growers in Haor areas who have involvement in homestead fruit production range from 26 to 60 with a mean and standard deviation of 47.22 and 8.93, respectively. Considering the observed age score of the farmers they were classified into three categories namely 'young (upto 30 years)', 'middle aged (31-50 years)' and 'old aged (above 50 years) aged'. The middle aged homestead fruit growers in Haor areas comprise the major proportion (48.89%) followed by old aged category (44.44%) and the young aged constitute the lowest (6.67%) proportion. Data also indicates that a total 93.33% fruit growers belonged to the middle and old aged group. The middle and young aged homestead fruit growers in Haor areas were generally tended to involve in homestead

fruit growing activities than the younger. Probably middle and old aged fruit growers were more sincere regarding the planting of different variety of fruit trees in their homestead areas. Mamun (2011) ^[11] reported that age is an important factor regarding knowledge because age had significant negative correlation with homestead farming knowledge. The level of educational scores of the homestead fruit growers in Haor areas of Bangladesh ranged from 0 to 14 with the mean and standard deviation of 4.26 and 4.68, respectively. Based on educational scores, fruit growers were classified into four categories such as 'illiterate' (0 to 'can sign only 0.5)', 'primary education' (1 to 5), 'secondary education' (6 to 10) and above secondary (above 10). According to the categories of fruit growers under

'illiterate' category constitute the highest proportion (53.34%) compared to 31.11% 'secondary level category and 11.11% above secondary level category. On the other hand, the lowest (4.44%) constitute primary level category. Education broadens the horizon of outlook of homestead fruit growers in Haor areas and expands their capability to analyze any situation related to homestead fruit cultivation. An educated Haor fruit grower is likely to be more responsive to the modern facts, ideas, technology and information of homestead fruits cultivation. To adjust with the same, illiterate group would be vulnerable to adopt as well as involve with modern management practices of homestead fruit cultivation. Saha (2001) ^[18] reported that level of education is an important factor because education

of the farmers had a positive significant relationship with their knowledge on improved practices of pineapple cultivation. Family size score of the fruit growers homestead fruit growers in Haor areas ranged from 2 to 6 with the mean and standard deviation of 4.18 and 1.11, respectively. According to family size the fruit growers were classified into three categories, viz. 'small, 'medium and 'large and the small family constitute the highest proportion (57.78%) followed by the medium family (37.78%). Only 4.44% fruit growers had large family size. Such finding is quite normal as per the situation of Bangladesh. It was also observed that average family size of the fruit growers was lower than that of national average of 5.4.

Table 2: Distribution of the respondents according to their selected characteristics

| Characteristics | Categories | Respondents | |
|-------------------------------------|--|-------------|------------|
| | | Number | Percentage |
| Age (years) | Young (up to 30 years) | 3 | 6.67 |
| | Middle (31-50 years) | 22 | 48.89 |
| | Old (above 50 years) | 20 | 44.44 |
| | Total | 45 | 100 |
| Education (Schooling years) | Illiterate (0 to can sign only-0.05) | 24 | 53.34 |
| | Primary (1-5) | 2 | 4.44 |
| | Secondary (6-10) | 14 | 31.11 |
| | Above secondary (above 10) | 5 | 11.11 |
| | Total | 45 | 100 |
| Family size (Number) | Small (up to 4) | 26 | 57.78 |
| | Medium (5-6) | 17 | 37.78 |
| | Large (above 6) | 2 | 4.44 |
| | Total | 45 | 100 |
| Annual income | Low income group (up to 70,000) | 4 | 8.89 |
| | Medium income group (70,001-140,000) | 28 | 62.22 |
| | High income group (above 140,00) | 13 | 28.89 |
| | Total | 45 | 100 |
| Age of homestead | Low aged homestead (up to 15 years) | 10 | 22.22 |
| | Medium aged homestead (16-30 years) | 16 | 35.56 |
| | High aged homestead (above 30 years) | 19 | 42.22 |
| | Total | 45 | 100 |
| Size of homestead | Small (up to 0.15 ha) | 12 | 26.67 |
| | Medium (.0.16-0.30 ha) | 20 | 44.44 |
| | Large (above 0.30 hectare) | 13 | 28.89 |
| | Total | 45 | 100 |
| Size of homestead fruit trees areas | Small (up to 0.10 ha) | 24 | 53.33 |
| | Medium (.0.11-0.20 ha) | 14 | 31.11 |
| | Large (above 0.20 hectare) | 7 | 15.56 |
| | Total | 45 | 100 |
| Livestock in homestead | Lowest number of livestock (up to 6) | 9 | 20.00 |
| | Medium number of livestock (7-12) | 22 | 48.89 |
| | Highest number of livestock (above 12) | 14 | 31.11 |
| | Total | 45 | 100 |

Annual family income score of the homestead fruit growers in Haor areas ranged from BDT 56 to 260 thousands with a mean and standard deviation of 123.5 and 46.67, respectively. On the basis of their annual income, the homestead fruit growers in Haor areas were classified into three categories, viz. low, medium and high annual income category. The homestead fruit growers in Haor areas having medium income constitute the highest proportion (62.22%) followed by high annual income (28.89%) and the low income group constitute the lowest proportion (8.89%). The age of homestead areas in Haor areas ranged from 8 to 40 years with a mean and standard deviation of 26.40 and 9.84, respectively. Based on age of homestead scores, they were classified into three categories such as 'low aged homestead (up to 15 years), 'medium aged homestead (16-30 years)

and high aged homestead (above 30 years). Age of homestead of fruit growers under high aged category constitutes the highest proportion (42.22%) compared to 35.56% of medium aged homestead and the lowest percentage 22.22% in low aged homestead. Rahman *et al.* (2009) ^[17] reported that villages of Bangladesh have a long heritage of growing fruit trees along with other perennial shrubs and herbs. The score of size of homestead of the fruit growers' homestead fruit growers in Haor areas ranged from 0.08 hectare to 0.56 hectare with a mean and standard deviation of 0.248 and 0.134, respectively. Based on their size of homestead, the fruit growers were classified into three categories. These categories were small size (upto 0.15 ha), medium size (0.16- 0.30 ha) and large size (above 0.30 ha). The medium size of homestead constitutes the highest

proportion 44.44% followed by 28.89% with large size homestead and the lowest 26.67% in small size homestead. The findings of the study reveal that majority of the homestead fruit growers in Haor areas were medium sized. Abdullah (1986) [2] reported that homestead land occupied by the dwelling unit of the household and the immediate area surrounding it, including courtyard, pond, road space, space used for cultivation of trees and vegetables. The score of size of homestead fruit trees areas of the fruit growers' homestead fruit growers in Haor areas ranged from 0.03 hectare to 0.38 hectare with a mean and standard deviation of 0.115 and 0.08, respectively. Based on their size of homestead fruit trees areas, the fruit growers were classified into three categories. These categories were small size (upto 0.10 ha), medium size (0.11- 0.20 ha) and large size (above 0.20 ha). The small size of homestead fruit trees areas constitutes the highest proportion 53.33% followed medium sized homestead fruit trees areas (31.11%) and the lowest 15.56% in large size homestead fruit trees areas. The findings of the study reveal that majority fruit growers were small to medium sized in their homestead fruit trees areas.

Knowledge on Management of Homestead Fruit Cultivation and Practice

Knowledge on management of homestead fruit cultivation and practices of homestead fruit growers in Haor areas could range from 10 to 64 against the possible range of 0-70 with the mean and standard deviation of 28.36 and 15.98,

respectively (Table 3). On the basis of knowledge on management of homestead fruit cultivation and practices scores, they were classified into three categories namely, low, medium and high knowledge. The majority (42.22%) of the fruit growers felt in low knowledge category followed by 37.78% in medium knowledge category and only 20.00% in high knowledge category. To perform optimum fruit production, fruit growers should have adequate knowledge on different aspects of the concern homestead fruit production technology. The findings of the present study revealed that 80.00% of the homestead fruit growers in Haor areas had low and medium knowledge on homestead fruit production activities. Most of the households in Haor areas involved in crop cultivation and fishery activities they have clear idea on that issue. They have clear idea on high yielding varieties, planting method of crop, seedling age, different insect and pests and many other aspects of crop cultivation. In case of vegetable, they know the time of planting in different vegetable with appropriate management procedure. They have clear idea on varieties, sowing time, fertilizer and manure, insect and pests and also their control method for vegetable cultivation. In fruit cultivation in homestead areas, they have an idea for placement of different fruits in different area based on their light requirements and they knew it from their past experiences. They have an idea on the propagating materials of different fruits and physical and cultural management for different fruit cultivation activities in their homestead areas.

Table 3: Distribution of the fruit growers according to their knowledge on management practices of homestead fruit cultivation

| Categories (Score) | Fruit growers | | Mean | Standard deviation |
|---------------------------|---------------|---------|-------|--------------------|
| | Number | Percent | | |
| Low knowledge (up to 20) | 19 | 42.22 | 28.36 | 15.98 |
| Medium knowledge (21-40) | 17 | 37.78 | | |
| High knowledge (above 40) | 9 | 20.00 | | |
| Total | 45 | 100.00 | | |

Relationship of the Selected Characteristics of Homestead Fruit Growers in Haor Areas with their Knowledge

Relationship between age, level of education, family size, annual income, age of homestead, size of homestead, size of homestead fruit trees area and number of livestock in homestead and knowledge on management of homestead fruit cultivation and practices of the growers in Haor areas was determined by Pearson product moment correlation coefficient. Table 4 revealed that level of education, annual income and size of homestead fruit trees area showed significant positive relationship with knowledge on management of homestead fruit cultivation and practices.

On the other hand, age showed significant negative relationship with knowledge of homestead fruit management of the growers in Haor areas which indicate that the old aged farmers had less knowledge on management of homestead fruit cultivation and practices in consideration of modern practices. Hossain (2000) found that the education of the respondents had significant positive relationship with their knowledge. Family size, size of homestead and number of livestock in homestead showed non significant positive relationship with knowledge of homestead fruit management of the growers in Haor areas. Mamun (2011) [11] reported that family size had non significant positive correlation with homestead farming knowledge.

Table 4: Correlation between different characteristics of the fruit growers, with their knowledge on management of homestead fruit production

| Characteristics | Level of education | Family size | Annual income | Age of homestead | Size of homestead | Size of homestead fruit trees | Knowledge on management of homestead fruit production |
|-------------------------------|--------------------|-------------|---------------|------------------|-------------------|-------------------------------|---|
| Age | -0.455** | -0.018 | -0.263 | 0.172 | 0.101 | 0.010 | -0.411** |
| Level of education | | 0.043 | 0.574** | -0.444** | -0.003 | 0.221 | 0.844** |
| Family size | | | 0.142 | 0.184 | -0.054 | -0.076 | 0.040 |
| Annual income | | | | -0.131 | 0.042 | 0.057 | 0.436** |
| Age of homestead | | | | | -0.005 | -0.198 | -0.417** |
| Size of homestead | | | | | | 0.852** | 0.031 |
| Size of homestead fruit trees | | | | | | | 0.307* |

** Correlation is significant at the 0.01 level *Correlation is significant at the 0.05 level

Different Aspects and Magnitude of Different Problems in Homestead Fruit Cultivation

Different aspects of fruit cultivation were identified in Haor areas as reason for fruit cultivation, procedure of fruit variety selection in homestead garden, procedure of fruit tree plantation and their management, management of fruit trees, affected of fruit trees by insects and diseases and application of pesticides. In case of reasons for fruit cultivation, the majority (60.00%) responded that they cultivate fruit for eating. For procedure of fruit variety selection in homestead garden, the majority (51.11%) use

own selection procedure. In relation to the procedure of fruit tree plantation, the majority (40.00%) use their own decision and opinion. In case of management of fruit trees, the majority (48.89%) replied that they practices management procedure sometimes. The most of the fruit growers reported that there were no serious attacked of insects (73.33%) and diseases (64.44%) and majority (75.56%) did not applied any pesticides for controlling insects and diseases (Table 5). In Bangladesh, various studies explore the floristic composition in the homestead gardens (Islam, 1998 and Motiur *et al.*, 2005) [9, 16].

Table 5: Distribution of the fruit growers according to the different aspects of fruit cultivation

| Characteristics | Categories | Fruit growers | |
|--|---|---------------|------------|
| | | Number | Percentage |
| Reason for fruit cultivation | For eating | 27 | 60.00 |
| | For marketing | 11 | 24.44 |
| | Both for eating and marketing | 6 | 13.33 |
| | Other reason (if any) | 1 | 2.22 |
| | Total | 45 | 100 |
| Procedure of fruit variety selection in homestead garden | From the information of agricultural office | 8 | 17.78 |
| | With own selection | 23 | 51.11 |
| | Information from neighboring people | 12 | 26.67 |
| | As the availability of variety in near by | 2 | 4.44 |
| | Total | 45 | 100 |
| Procedure of fruit tree plantation and their management | As per standard/appropriate procedure | 11 | 24.44 |
| | As per own decision and opinion | 18 | 40.00 |
| | Information from neighboring people | 12 | 26.67 |
| | As per the information of radio and TV | 4 | 8.89 |
| | Total | 45 | 100 |
| Is they follow the management of fruit trees? | No | 18 | 40.00 |
| | Sometimes | 22 | 48.89 |
| | Regularly | 5 | 11.11 |
| | Total | 45 | 100 |
| Is the fruit tress affected by insects? | Yes | 12 | 26.67 |
| | No | 33 | 73.33 |
| | Total | 45 | 100 |
| Is the fruit tress affected by diseases? | Yes | 16 | 35.56 |
| | No | 29 | 64.44 |
| | Total | 45 | 100 |
| Did you apply pesticides | Yes | 11 | 24.44 |
| | No | 34 | 75.56 |
| | Total | 45 | 100 |

In consideration of problem index (PI), according to the fruit growers opinion, lack of technical knowledge about materials is the 1st category problem in fruit cultivation followed by high rate of interest and adequate loan demand and also inadequacy and high price of inputs. On the other hand, interference of middle man to get loan, shortage of

cold storage is the more manageable problems regarding to increases of homestead fruit production in Haor areas (Table 6). Homestead fruit production is quite prevalence in Bangladesh with some common problem (Alam and Masum, 2005) [4].

Table 6: Comparison of magnitude of different problems in homestead fruit cultivation in Haor areas

| SL. No. | Problem | High (3) | Moderate (2) | Little (1) | Not at all (0) | PI | Rank order |
|---------|--|----------|--------------|------------|----------------|------|------------|
| 1 | Inadequacy of inputs | 27 | 13 | 3 | 2 | 110 | 4 |
| 2 | High price of inputs | 21 | 18 | 3 | 3 | 102 | 5 |
| 3 | Low quality of materials | 12 | 17 | 11 | 5 | 81 | 8 |
| 4 | Lack of technical knowledge about materials | 32 | 11 | 2 | 0 | 120 | 1 |
| 5 | Shortage of cold storage. for fruit preservation | 10 | 13 | 12 | 10 | 68 | 11 |
| 6 | Decrease of weight in fruit preservation | 16 | 8 | 12 | 9 | 75 | 10 |
| 7 | Transport problem for marketing | 8 | 21 | 10 | 6 | 76 | 9 |
| 8 | Deprive from accurate sale price | 17 | 22 | 3 | 3 | 98 | 6 |
| 9 | Lack of loan facilities at optimum time | 19 | 18 | 3 | 5 | 96 | 7 |
| 10 | High rate of interest | 34 | 6 | 5 | 0 | 119 | 2 |
| 11 | Interfere of middle man to get loan | 3 | 12 | 11 | 19 | 44 | 12 |
| 12 | Inadequate loan than demand | 27 | 18 | 0 | 0 | 117 | 3 |
| | Total | 226 | 177 | 74 | 63 | 1106 | -- |

Conclusion

The majority (42.22%) of the respondents felt in low knowledge category followed by medium knowledge category (37.78%) in homestead fruit production activities and only 20.00% in high knowledge category. Age, level of education, family size, annual income, age of homestead, size of homestead and size of homestead fruit trees area and knowledge on management of homestead fruit production and practices in Haor areas was determined by Pearson product moment correlation coefficient. Level of education, annual income and size of homestead fruit trees area showed significant positive relationship with knowledge on management of homestead fruit production and practices in Haor areas. On the other hand, age showed significant negative relationship with knowledge of homestead fruit management of the growers in Haor areas. Family size and size of homestead showed non significant positive relationship with knowledge on management of homestead fruit production and practices of the fruit growers in Haor areas.

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