Baseline survey for farm productivity improvement through agricultural technologies in Charland of Mymensingh

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ABSTRACT

The base line survey was conducted at Sadar upazila of Mymensingh district, to know the existing farming system of the farmers during the crop year 2017-18. The survey was conducted to documented information regarding farmers homestead, crop, traditional agriculture technologies, socioeconomic, livelihood information, problems and potentials affecting the present farming systems with data pertaining to 60 farmers from two villages of Char Sirta union. Random sampling technique administrated by the researchers for collecting information from the selected farm households with the help of a predesigned questionnaire. After collection of data, each interview scheduler was verified for the sake of consistency and completeness. Summarization, careful scrutiny and necessary summery tables have been made from the data. Tabular techniques have been used for analysis, interpretation and presentation of data to fulfill the objectives of the base line survey. The result of the baseline survey showed that out of 60 sample farmer's landless (less than 0.02ha), marginal (0.021-0.2ha), small (0.21-1 ha), medium(1-3ha) and large (>3ha) farmer numbers were 5, 14, 27, 11 and 3, respectively. Five types of major farming systems exist in the Farming System Research and Development (FSRD) site of BARI. Among the five farming systems, the highest number of farmers practiced Crop +livestock +poultry + agro forestry + homestead production system followed by Crop + Livestock+ poultry + homestead system. About 91% of lands were used under HYV crop variety whereas only 9% land use under local variety. In the site, only HYV rice varieties were used during Boro season whereas in T.aman season both HYV and local varieties were used. There were four major cropping patterns in the study area. The main cropping pattern was Fallow- Boro-T. aman rice followed by Potato-Boro-T.aman and year round vegetable. Out of 60 sample farmers, 16 farmers followed culture fishes in the FSRD site where on an average, fish production 269.33 kg/farm/year. The farmers of the area follow polyculture for fish production. Main source of income of the farmers of the selected area were from crop, livestock, fisheries and others non-farm activities (business, service rickshaw pulling, van pulling and day labor etc.). In case of landless and marginal farm, non-farm income (others) was higher compared to farm income. Contrary, it was observed that small, medium and large farm income from farm was higher compared to non-farm activities (business & others). Farming constraints that were identified include lack of knowledge about new crop variety and technology
was the main problems of the farmer followed by high price of inputs, lack of knowledge about fish feed and pond management, lack of quality seeds/fingerlings/duck links, lack of credit facility, lack of knowledge about homestead vegetables production, lack of knowledge about vaccination, deworming, feed of livestock and poultry, insect/pests/weeds and lack of money for buying inputs.

**Key Words:** Baseline, sample size, methodology, intervention, homestead and management

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### I. Introduction

Bangladesh is predominantly an agrarian country. Due to its very fertile land and favorable weather, varieties of crop grow abundantly in this country. Agriculture sector contributes about 15 percent to the country’s Gross Domestic Product (GDP) and employs around 41 percent of total labour force (BBS, 2017). The agricultural and rural sector in Bangladesh has a particular importance for the sustained food and livelihood security of its large, dense and ever-growing population. The agricultural activities in the country are pursued intensively for the crop as well as allied sectors and in conditions of scarce natural resources. The performance of this sector has a great impact on macro-economic situation like employment generation, poverty alleviation, food security and nutritional attainment etc. Resource-poor farmers comprise the bulk of the farming community in Bangladesh. GDP growth rate of Bangladesh mainly depends on the performance of the agriculture sector. Due to natural calamities like flood, cyclone, drought, loss of production in both food and cash crops are almost a regular phenomenon. Yet in recent years, there has been a substantial increase in food grain production. Agricultural holding in Bangladesh is generally small but use of modern machinery and equipment is gradually increasing. Rice, jute, sugarcane, potato, pulses, wheat, tea and tobacco are the principal crops of Bangladesh. Crop diversification programme, credit supply, extension work, research and input distribution policies pursued by the government are yielding positive results. The country is now on the threshold of attaining self-sufficiency in food grain production. About 17 million households in Bangladesh, marginal and small farmers (holding 0.5 to 0.49 and 0.50 to 2.49 acre, respectively) jointly with landless households make up more than 70 % of the farm families (BBS, 2017). With ever-increasing population and disintegration of land, small farmers are becoming marginal. Over the last some decades agricultural research has emphasized the needs of farmers with inadequate resource support. Farming in Bangladesh is primarily of survival level. Farmers produce diversified products to meet their home consumption, necessities and other household needs. Most farms raise field crops, homestead vegetables and trees, livestock, poultry and intermittently fish. Off-farm and non-farm activities are pursued to extra cash requirements. Rigorous use of land and the exchanges of multiple farm components and activities make the farming systems of Bangladesh highly multifarious. Accordingly, the interdependence of resources is usually higher in small farming compared to conventional farming and it also enhances sustainable agriculture which in turn leads to total production and household income (Taj Uddin and Takeya, 2007).

According to the “National Conservation Strategy Papers” charlands are mostly distributed in 11 districts of Bangladesh covering a land area of about 0.82 million hectares. The modern agricultural technologies are not properly disseminated in the char land due to scattered, isolated and disconnected transport network. A large number of people stay in the chars taking high risk of natural vulnerability. According to the 7th Five Year Plans and SDGs, poverty alleviation, end hunger, achieve food security and improved nutrition and promote sustainable agriculture is the new challenge for researchers, extensionists and farmers. Considering the complex factors the char dwellers often could not choose the best farming practices to be followed in their lands. As a result their income becomes lower. From the activities of some projects and NGOs it is clearly understood that, integrated farming approach is one of the best way for income generation of char dwellers. Hence, sustainable increase in food production broadly to achieve food self-sufficiency and reduce poverty of the farmers in char land
under continuing rise in population, economic growth, changing food habit, rapid urbanization and severe climate change situation is crucial to economic growth and development. This increase in food production will have to be achieved by using less land, with less water, labor and chemicals (Doss, 2006). Dey et al. (2005) mentioned that the technologies have been widely adopted by the neighboring communities in the farming system research sites. Mamun et al. (2011) explored the linkages of components in the farming system to enhance the farm productivity, reduce the environmental degradation and improve the quality of life for poor farmers and to maintain sustainability. In Farming System Research and Development site, the farmers by participating in the research process help in the identification of the research problems as well as take part in testing the possible solution.

Before starting the Farming system research activities, a base line survey was carried out to understand existing crop, variety, cropping pattern, input use, cost of production, socio-economic and agro-climatic situation, problems and potentials affecting the present farming systems. The results of base line survey help to know the present status of different farm enterprises, explore the constraints to implement and opportunities for further expansion and develop appropriate research program for increasing farm productivity and reduce the degradation of environment quality or to develop sustainable land use, which will optimize farm resource, minimum degradation with consideration to regenerative capacity, increase income and employment for farm families and promote quality of life.

II. Materials and Methods

Location of the Study area: Mymensingh is one of the districts of Mymensingh division, Bangladesh, Mymensingh town is the district headquarters. Mymensingh Sadar upazila is located at 24.7500°N to 90.4167°E. It has 104567 units of household and its total area is 388.45 km². The River Brahmaputra just crosses the section of Mymensingh. A hundred plus years ago the river was widened 5-10 km and now it is a seasonal flow, not an ever-flowing river. A huge land recovered from this riverbed for a hundred years as named 'CHARS' is a big part of Mymensingh and as it was riverine land regular seasonal flood water namely from the GARO hills of Meghalaya of India flashes up to these CHAR's. Mymensingh Sadar had a population of 775733. Males constituted 50.43% of the population and females 49.57%. Muslims formed 93.83% of the population, Hindus 5.96%, Christians 0.17% and others 0.04%. Mymensingh Sadar had a literacy rate of 51.74% for the population 7 years and above. The temperature ranges from 12 to 33 °C, and the annual rainfall averages 2,174 mm. The soil composition is mainly sandy to clay loam in texture.

Selection of the Study Area: The study area selection is a vital footstep which depend on objectives of the survey. According to Yang (1962) the area of a survey depends on the meticulous purpose of the survey and the probable collaboration of the farmers. In FSRD site, Char Kharicha, Mymensingh, two villages were selected under Sirta union from Sadar Upazila of Mymensingh district.
Data: The study accounting data of 60 farms were collected from two villages of Char Sirta Union under Sadar Upazila of Mymensingh for base line survey of farming systems research and development project by using Random Sampling Technique method. The data were collected through farmers’ interview by structured questionnaire.

Sample Size: At first, a list of all farms of the villages named Char Kharicha and Char Anandipur were prepared and then four categories 60 farms were selected by using random sampling technique. The study accounting data of 60 farms were collected for baseline survey of farming systems research and development project for farmer’s livelihood improvement in char land eco-system.

Processing, Analysis and Presentation of Data: Each interview schedule confirmed its consistency and completeness after collection of data. Editing was done before putting the data in the computer. Necessary summery tables have been made after analysis and summarization of the data. Tabular techniques have been used for analysis, interpretation and presentation of data to fulfill the objectives of the survey.

III. Results and Discussion
Farm size and family size of the selected farmers
Based on farm category, sample farmers were grouped into five categories viz. landless, marginal, small, medium and large. According to agricultural extension manual, the farmer those who have less than 0.02 hectare of cultivable land are belongs to landless, cultivable land is 0.021 to 0.2 hectare grouped as marginal farmer, the farmer who possesses 0.21 to 1.0 hectare of cultivable land are categorized as small farmer, while 1.01 to 3.0 hectare of cultivable lands are medium and those who are cultivating more than 3.0 hectare of land are large farmer. Out of sixty farmer’s average farm size ranged from 0.02 to 3.78 hectare. Average farm size for landless, marginal, small, medium and large were 0.02 ha, 0.17 ha, 0.93 ha, 1.85 ha and 3.78 ha, respectively. Again, average family size for landless, marginal, small, medium and large were 4.25, 5.00, 4.75, 7.50 and 6.23 members, respectively (Table 01).

Table 01. Average family and farm size of the sample farmers according to farm categories of Farming Systems Research and Development site (FSRD), Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Farm Categories</th>
<th>Farm size (ha)</th>
<th>Family size (no)</th>
<th>Number of sample farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landless (0.02 ha)</td>
<td>0.02</td>
<td>4.25</td>
<td>05</td>
</tr>
<tr>
<td>Marginal (0.021-0.2 ha)</td>
<td>0.17</td>
<td>5.00</td>
<td>14</td>
</tr>
<tr>
<td>Small (0.21-1 ha)</td>
<td>0.93</td>
<td>4.75</td>
<td>27</td>
</tr>
<tr>
<td>Medium (1-3 ha)</td>
<td>1.70</td>
<td>7.5</td>
<td>11</td>
</tr>
<tr>
<td>Large (above 3 ha)</td>
<td>3.78</td>
<td>6.23</td>
<td>03</td>
</tr>
</tbody>
</table>

Literacy level of selected farmers
The level of education of the sample farmers have been divided into five groups, illiterate, PECE (Primary Education Completion Examination), JSC (Junior School Certificate), SSC (Secondary School Certificate), HSC (Higher Secondary Certificate and above). On an average 17 % sample farmers were illiterate and rest 83 % was literate which was quite higher than national average. Among the five levels highest percent of the farmers was in PECE level whereas lowest in HSC and Above H.S.C level (Table 02).

Age distribution of selected farmers: There is little variation in the age of households of the five categories (Land less, marginal, small, medium and large) of the farmer. Most of the respondents (45%) belonged to age group 30-60 years. The average age of the sample farmers was 44 years in all groups (Table 03). However, the aged person (47 Years) belonged to landless category farm size while small and medium farmers are younger in age (41 Years). In case of farming, age, literacy and farm size have might put important impact in decision making. The younger farmers are more technically efficient and can easily adopt new technology and thereby increase his efficiency and income than those of older ones (Battese and Coelli, 1995).
Table 02. Educational level of different categories of farmers of Farming System Research and Development site (FSRD), Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Farmer category</th>
<th>Educational level (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Illiterate</td>
</tr>
<tr>
<td>Landless (0.02 ha)</td>
<td>40</td>
</tr>
<tr>
<td>Marginal (0.021-0.2 ha)</td>
<td>25</td>
</tr>
<tr>
<td>Small (0.21-1 ha)</td>
<td>20</td>
</tr>
<tr>
<td>Medium (1-3 ha)</td>
<td>0</td>
</tr>
<tr>
<td>Large (above 3 ha)</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 03. Average age level of different categories of farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Farmer category</th>
<th>Average age (Years)</th>
<th>Age group (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Below 30</td>
<td>30-60</td>
</tr>
<tr>
<td>Landless (0.02 ha)</td>
<td>47</td>
<td>3 (60)</td>
</tr>
<tr>
<td>Marginal (0.021-0.2 ha)</td>
<td>45</td>
<td>6 (43)</td>
</tr>
<tr>
<td>Small (0.21-1 ha)</td>
<td>40</td>
<td>3 (27)</td>
</tr>
<tr>
<td>Medium (1-3 ha)</td>
<td>42</td>
<td>10 (37)</td>
</tr>
<tr>
<td>Large (above 3 ha)</td>
<td>46</td>
<td>1 (33)</td>
</tr>
<tr>
<td>All farmers</td>
<td>44</td>
<td>23 (38)</td>
</tr>
</tbody>
</table>

Figures in the parenthesis indicate percentage (%) of the total.

Main occupation of selected farmers

Main occupation of all categories of farmers is agriculture. However, the secondary occupation varied among the farmers. About 75% of the respondents at marginal level had secondary occupation like business (25%) and rickshaw/van puller (50%). On the other hand, 25 % of the respondents of small farmers had secondary occupation like business (Table 04).

Table 04. Occupational status of the sample farmers of different categories farm at FSRD site, Mymensingh

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Farmers category</th>
<th>All farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Marginal</td>
<td>Small</td>
</tr>
<tr>
<td><strong>Main occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>4 (100)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Day labor</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Govt. service</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Secondary occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private service</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Teaching</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Business</td>
<td>1(25)</td>
<td>1(25)</td>
</tr>
<tr>
<td>House keeping</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Driver</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rickshaw/Van puller</td>
<td>2 (50)</td>
<td>-</td>
</tr>
<tr>
<td>All farmers</td>
<td>3 (75)</td>
<td>1(25)</td>
</tr>
</tbody>
</table>

Household and Farm Assets information

Farmers of the FSRD site, Mymensingh possesses a very few household and farm assets. Among twelve farm families had more than two electric fan (2.75), table (2.25), khat (2.75) and mobile phone (2.58) while more than four chair (4.75). Sewing machine, radio-television and freeze belonging to farmer are in one. For crop production 2-wheeler tractor and accessories, insecticide/pesticide sprayers are possessed by one farmer whereas water pump and tube well belonging to farmers are more than one (1.33 and 1.0). On an average every farmer had a cattle shed (Table 05).

Land Ownership pattern

At the FSRD site, Mymensingh three types of land holding systems were observed. These were (i) Rented in and rented out (ii) leased in and leased out (iii) mortgage in and mortgage out land holding system. Rented in and rented out system land holder provide one third of their produces to the owner.
of the land. Leased in and leased out system land holder cultivates the land providing a certain amount of money (non returnable) to the owner of the land. Mortgage in and mortgage out system, land holder cultivates the land providing a certain amount of money (returnable) to the owner of the land. The formula for computing total cultivated land is own cultivated land + all in land – all out land. Own cultivated land for marginal, small, medium and large farmers were 0.11, 0.78, 1.65 and 4.24 ha, respectively whereas total cultivated land for marginal, small, medium and large were 0.17, 0.93, 1.70 and 3.78ha, respectively (Table 06).

Table 05. Household and Farm assets of sample farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Household assets</th>
<th>Number</th>
<th>Farm asset</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewing machine</td>
<td>0.17</td>
<td>2-wheel Tractor and accessories</td>
<td>0.42</td>
</tr>
<tr>
<td>Radio TV</td>
<td>0.33</td>
<td>4-wheel Tractor and accessories</td>
<td>-</td>
</tr>
<tr>
<td>Freeze</td>
<td>0.75</td>
<td>Insecticide/pesticide sprayers</td>
<td>0.67</td>
</tr>
<tr>
<td>Fan</td>
<td>2.75</td>
<td>Water pump</td>
<td>1.33</td>
</tr>
<tr>
<td>Table</td>
<td>2.25</td>
<td>Tube well/Agro well</td>
<td>1.0</td>
</tr>
<tr>
<td>Chair</td>
<td>4.75</td>
<td>Poultry shed</td>
<td>0.08</td>
</tr>
<tr>
<td>Khat</td>
<td>2.75</td>
<td>Cattle shed</td>
<td>1.0</td>
</tr>
<tr>
<td>Phone (mobile or land line)</td>
<td>2.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicyde</td>
<td>0.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three wheeler/Rickshaw/Van</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 06. Land ownership pattern of different farm categories at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Farm category</th>
<th>Own cultivated land (ha)</th>
<th>Leased out land (ha)</th>
<th>Leased in land (ha)</th>
<th>Mortgage out land (ha)</th>
<th>Mortgage in land (ha)</th>
<th>Rent out land (ha)</th>
<th>Rent in land (ha)</th>
<th>Homestead area (ha)</th>
<th>Total cultivated land (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landless</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td>Marginal</td>
<td>0.11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.02</td>
<td>-</td>
<td>-</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Small</td>
<td>0.78</td>
<td>-</td>
<td>0.06</td>
<td>0.02</td>
<td>0</td>
<td>0</td>
<td>0.03</td>
<td>0.08</td>
<td>0.17</td>
</tr>
<tr>
<td>Medium</td>
<td>1.65</td>
<td>0.02</td>
<td>0.12</td>
<td>0.10</td>
<td>0.25</td>
<td>-</td>
<td>0.10</td>
<td>1.70</td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td>4.24</td>
<td>0.06</td>
<td>0.41</td>
<td>0.11</td>
<td>-</td>
<td>0.12</td>
<td>-</td>
<td>3.78</td>
<td></td>
</tr>
</tbody>
</table>

Total cultivated land=Own cultivated land+ all in land-all out land

Land and soil type of the sample farmers
There are five land type and four soil types are found in the study area. High land: This land is high and also cannot hold water during monsoon. Medium high land: This land is relatively lower high than high land and comparatively more fertile than high land. Medium land: The medium land is uniformly flat faced, water holding capacity is higher than high land and medium high land, In the monsoon, normally no water are retains in the land but water can be easily retained by raising “bandh” around the field. Medium low land and low land: This land also uniformly flat faced and water movement can easily be controlled by “bandh”. The main characteristic of these land are it stays under 1 or 2 feet water for 2-3 months. Sometimes in rainy season water level of this land can be raised. The highest amounts of land exist under medium high land and loamy to clay soil type (Table 07).

Major farming systems followed by the sample farmers
There are five types of farming systems exist in the farming system research and development site. Among the five farming systems, the highest number of farmers (40%) possessed the crop, livestock, poultry, agro forestry and homestead farming system. On the other hand, 33 % farmers were under in crop, livestock, poultry and homestead farming (Table 08).

Major crops growing in rabi season
In rabi season, about 91% of lands were used under HYV crop variety whereas only 9% land use under local variety. Out of 51.40 hectare of land under HYV crops area, the highest area under boro rice followed by potato, vegetable and chilli. In boro rice only high yielding variety was cultivated by the farmer in the study area. The average yield of boro rice was 6.07 t/ha and coverage was 33.71 hectare of land. In potato and other vegetable both the HYV and local varieties were cultivated by the farmers.
In case of spice crops, farmers were usually practiced local varieties and they have got lower yield compared to their potential yield due to crop variety and management practices (Table 09). These results are in agreement with the findings of Anowar et al. (2015).

Table 07. Land and soil type of the sample farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Land Type</th>
<th>Irrigated Area (ha)</th>
<th>Irrigated Soil type</th>
<th>Non irrigated Area (ha)</th>
<th>Non irrigated Soil type</th>
<th>Total Area (dec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High land</td>
<td>4.58</td>
<td>Sandy to loamy</td>
<td>8.25</td>
<td>Sandy</td>
<td>12.83</td>
</tr>
<tr>
<td>Medium high land</td>
<td>10.50</td>
<td>Sandy to loamy</td>
<td>2.08</td>
<td>Sandy</td>
<td>12.58</td>
</tr>
<tr>
<td>Medium land</td>
<td>21.25</td>
<td>Loamy to Clay</td>
<td>-</td>
<td>-</td>
<td>21.25</td>
</tr>
<tr>
<td>Medium low land</td>
<td>6.47</td>
<td>Loamy to Clay</td>
<td>-</td>
<td>-</td>
<td>6.47</td>
</tr>
<tr>
<td>Low land</td>
<td>4.50</td>
<td>Clay</td>
<td>-</td>
<td>-</td>
<td>4.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>47.83</strong></td>
<td></td>
<td><strong>10.33</strong></td>
<td></td>
<td><strong>57.63</strong></td>
</tr>
</tbody>
</table>

Table 08. Major farming systems of the sample farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Major farming system</th>
<th>Households number</th>
<th>% of total Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Crop + Livestock</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Crop + Poultry</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Crop + Livestock + Poultry + Household</td>
<td>20</td>
<td>33</td>
</tr>
<tr>
<td>Crop + Livestock + Poultry + Fisheries +Household</td>
<td>08</td>
<td>13</td>
</tr>
<tr>
<td>Crop + Livestock + Fisheries +Agroforestry+Household</td>
<td>04</td>
<td>07</td>
</tr>
<tr>
<td>Crop + Livestock + Poultry+Agroforestry+Household</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td>Crop + Livestock + poultry+Fisheries+Agroforestry+Household</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 09. Area and major crops grown in rabî season at FSRD site, Char Kharicha, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Crops</th>
<th>HYV</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area (ha)</td>
<td>Yield (t ha⁻¹)</td>
</tr>
<tr>
<td>Boro rice</td>
<td>33.71</td>
<td>6.07</td>
</tr>
<tr>
<td>Wheat</td>
<td>1.73</td>
<td>2.8</td>
</tr>
<tr>
<td>Potato</td>
<td>10.15</td>
<td>32.1</td>
</tr>
<tr>
<td>Vegetable</td>
<td>3.12</td>
<td>35.95</td>
</tr>
<tr>
<td>Chilli</td>
<td>2.34</td>
<td>1.42</td>
</tr>
<tr>
<td>Zinger</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Garlic</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Onion</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Turmeric</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Others</td>
<td>0.35</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>51.40</td>
<td>-</td>
</tr>
</tbody>
</table>

Major crops growing in kharîf season
In kharîf season, about 87% of lands were used under HYV crop variety whereas only 13% land use under local variety. Out of 50.95 hectare of land under HYV crops area, the highest area under Taman rice followed by bottle gourd, ash gourd and other vegetable. In T. aman rice both high yielding and local varieties were cultivated by the farmers while in T.aus rice only high yielding variety was cultivated by the farmer in the study area. The average yield of T. aman rice in HYV was 4.74 t ha⁻¹ while by cultivating local varieties farmer can get lower yield 2.97 t ha⁻¹. In case of summer vegetables most of the area covered by HYV varieties for their better yield (Table 10).

Time of sowing and harvesting of major crops
Sowing/planting and harvesting time differs in different agro-ecological zones. It might be due to land type and the cropping pattern followed by the farmer of that respected agro-ecological zone. At FSRD site, Char Kharicha, Sadar, Mymensingh sowing/planting and harvesting time of different crops are
shown in Table 11. Boro rice transplanted during January to February and harvested in April to May whereas T.aman was transplanted on July to August and by mid May T.aus was completed to transplant. The both T.aman and T.aus were harvested accordingly after completing the expected duration. The pattern Fallow- Boro- T.aman rice and Potato- Boro- T.aman rice cropping pattern followed by FSRD site, Mymensingh. Lahirirhat under Rangpur district practiced in transplanted Boro rice during February to March (Anowar et al., 2015). A small extent of wheat were cultivated by the farmer in expected time schedule and harvested as well. Year round vegetables (September to May) and spices (October to March) are grown and harvested by the farmers in their homestead and high land.

Table 10. Yield and area covered by major crops grown in kharif season at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Crops</th>
<th>HYV Area (ha)</th>
<th>HYV Yield (t ha⁻¹)</th>
<th>Local Area (ha)</th>
<th>Local Yield (t ha⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.aus rice</td>
<td>1.41</td>
<td>4.12</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T.aman rice</td>
<td>28.63</td>
<td>4.74</td>
<td>2.15</td>
<td>2.97</td>
</tr>
<tr>
<td>Sweet gourd</td>
<td>1.78</td>
<td>28.71</td>
<td>0.55</td>
<td>17.30</td>
</tr>
<tr>
<td>Ash gourd</td>
<td>1.66</td>
<td>25.55</td>
<td>1.30</td>
<td>15.67</td>
</tr>
<tr>
<td>Bottle gourd</td>
<td>8.10</td>
<td>32.37</td>
<td>1.58</td>
<td>25.30</td>
</tr>
<tr>
<td>Bitter gourd</td>
<td>0.66</td>
<td>24.31</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Snake gourd</td>
<td>0.44</td>
<td>29.77</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Others</td>
<td>1.42</td>
<td>-</td>
<td>1.27</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>44.10</td>
<td>-</td>
<td>6.85</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 11. Time of sowing and harvesting of major crops grown at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Crops</th>
<th>Sowing/planting time range</th>
<th>Harvesting time range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boro rice</td>
<td>January to February</td>
<td>April to May</td>
</tr>
<tr>
<td>T.aus rice</td>
<td>May</td>
<td>August</td>
</tr>
<tr>
<td>T.aman rice</td>
<td>July to August</td>
<td>October to 30 November</td>
</tr>
<tr>
<td>Zinger</td>
<td>March to April</td>
<td>January to February</td>
</tr>
<tr>
<td>Garlic</td>
<td>October to November</td>
<td>March to April</td>
</tr>
<tr>
<td>Onion</td>
<td>October to November</td>
<td>February to March</td>
</tr>
<tr>
<td>Turmeric</td>
<td>March to April</td>
<td>January to February</td>
</tr>
<tr>
<td>Chilli</td>
<td>September to October</td>
<td>January to March</td>
</tr>
<tr>
<td>Potato</td>
<td>October to November</td>
<td>December to February</td>
</tr>
<tr>
<td>Brinjal</td>
<td>September to October</td>
<td>March to April</td>
</tr>
<tr>
<td>Radish</td>
<td>September to October</td>
<td>November to December</td>
</tr>
<tr>
<td>Sweet gourd</td>
<td>September to October</td>
<td>January to February</td>
</tr>
<tr>
<td>Ash gourd</td>
<td>March to April</td>
<td>May to June</td>
</tr>
<tr>
<td>Bottle gourd</td>
<td>January to February</td>
<td>November to December</td>
</tr>
<tr>
<td>Bitter gourd</td>
<td>April to May</td>
<td>July to August</td>
</tr>
<tr>
<td>Snake gourd</td>
<td>April to May</td>
<td>July to Aug</td>
</tr>
</tbody>
</table>

Major cropping patterns practiced by the sample farmers

Cropping pattern of an area depends on soil type, land type, farms category (marginal, small, medium and large) and AEZ due to climate, soil and farmers interest in crop production. However, six major cropping patterns were followed by the farmers of the study area. The main cropping patterns were Fallow- Boro-T.aman followed by Potato-Boro-Taman-, Potato-Vegetables-Vegetables-, year round vegetables Vegetables-Vegetables-Onion and year round zinger (Table 12). The crop varieties of different crops are varied depending on crops. Farmers usually practiced HYV and hybrid variety for rice cultivation, whereas local variety “Ausha” is extensively followed for potato production due to early marketing. While some of hybrid and local varieties are used for vegetables production and zinger varieties are preferably local. The varieties of the different crops in the site are shown in Table 12.
Table 12. Major cropping patterns, crops and variety used by the farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Cropping patterns and variety of crops in different seasons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kharif-1</td>
</tr>
<tr>
<td></td>
<td>Crop</td>
</tr>
<tr>
<td>Fallow- Boro-Taman Boro</td>
<td>Boro</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato-Boro-T.aman Boro</td>
<td>Boro</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato- Veg-Veg Veg</td>
<td>Veg</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Year round veg Veg</td>
<td>Veg</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Veg-Veg-Onion Veg</td>
<td>Veg</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinger</td>
<td>Zinger</td>
</tr>
</tbody>
</table>

Per farm input used by the sample farmers: Labour, seed, fertilizers, pesticide, irrigation are the main inputs for crop production. At the FSRD site, Boro, T.aman, vegetables, are the major crops grown. A small scale of wheat is also cultivated by the farmers. Among the crops highest input cost was in potato followed by vegetables, brinjal, bottle gourd and Boro cultivation (Table 13).

Table 13. Average input used for different crop production by the farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Name of crops</th>
<th>Labor (Male + Female)</th>
<th>Seed (kg)</th>
<th>Urea (kg)</th>
<th>TSP (kg)</th>
<th>MP (kg)</th>
<th>ZnSO4 (kg)</th>
<th>Gyp (kg)</th>
<th>Cow dung (kg)</th>
<th>Pesticide (Tk)</th>
<th>Irrigation (Tk)</th>
<th>Total input cost (Tk ha⁻¹)</th>
<th>Tillage cost (Tk ha⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boro</td>
<td>140</td>
<td>40</td>
<td>200</td>
<td>116</td>
<td>124</td>
<td>7</td>
<td>84</td>
<td>5000</td>
<td>5000</td>
<td>9000</td>
<td>61680</td>
<td>6750</td>
</tr>
<tr>
<td>T.aman</td>
<td>120</td>
<td>35</td>
<td>150</td>
<td>45</td>
<td>80</td>
<td>-</td>
<td>45</td>
<td>-</td>
<td>2000</td>
<td>3000</td>
<td>41548</td>
<td>5625</td>
</tr>
<tr>
<td>Wheat</td>
<td>90</td>
<td>130</td>
<td>200</td>
<td>150</td>
<td>100</td>
<td>-</td>
<td>60</td>
<td>-</td>
<td>2000</td>
<td>3000</td>
<td>45520</td>
<td>5250</td>
</tr>
<tr>
<td>Potato</td>
<td>200</td>
<td>1600</td>
<td>300</td>
<td>120</td>
<td>240</td>
<td>16</td>
<td>70</td>
<td>900</td>
<td>8000</td>
<td>4500</td>
<td>130650</td>
<td>6250</td>
</tr>
<tr>
<td>Brinjal</td>
<td>220</td>
<td>0.30</td>
<td>300</td>
<td>222</td>
<td>206</td>
<td>10</td>
<td>96</td>
<td>5000</td>
<td>9000</td>
<td>6000</td>
<td>65960</td>
<td>5250</td>
</tr>
<tr>
<td>Gourd</td>
<td>70</td>
<td>6</td>
<td>160</td>
<td>160</td>
<td>150</td>
<td>10</td>
<td>110</td>
<td>5000</td>
<td>6000</td>
<td>5000</td>
<td>65320</td>
<td>5250</td>
</tr>
<tr>
<td>Veg</td>
<td>140</td>
<td>-</td>
<td>230</td>
<td>150</td>
<td>120</td>
<td>10</td>
<td>60</td>
<td>5000</td>
<td>6000</td>
<td>4800</td>
<td>86780</td>
<td>5600</td>
</tr>
</tbody>
</table>

Homestead vegetable production and disposal pattern
Homestead vegetable production increases consumption of vegetables per person per family. There are six to ten production units (Open sunny places, roofs, trellis, fences, marshy areas, slightly marshy areas, back yard, etc.) in the homestead area. Among the sample farmers, average per farm vegetables production was 116 kg among which 27 kg in Kharif-1 season, 35 kg in Kharif-2 season and 54 kg in rabi season. The sample farmers consumed 55 kg, distributed 19 kg, sold 35 kg and damage 7 kg vegetables (Table 14).

Table 14. Average homestead vegetable production and disposal pattern at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Crop season</th>
<th>Total production (kg)</th>
<th>Consumption (kg)</th>
<th>Distribution (kg)</th>
<th>Sold (kg)</th>
<th>Damage (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kharif-1</td>
<td>27</td>
<td>15</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Kharif-1</td>
<td>35</td>
<td>20</td>
<td>4</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Rabi</td>
<td>54</td>
<td>20</td>
<td>10</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td>55</td>
<td>19</td>
<td>35</td>
<td>7</td>
</tr>
</tbody>
</table>

Homestead fruits production and disposal pattern: There observed six types of fruit trees at FSRD site under Mymensingh during 2017-18. Average production of mango was 43 kg while jackfruit, banana, papaya, olive and coconut were 92, 45, 82, 31 and 21 kg, respectively. The farmers consumed most of their produces and distributed to some extent and some of them are sold (Table 15). A very few were damaged or rotten by hazardous condition.
Table 15. Average fruits production and disposal pattern of sample farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Items</th>
<th>Av. production Qty (kg)/no</th>
<th>Consumption Qty (kg)/no</th>
<th>Sold Qty (kg)/no</th>
<th>Distribution Qty (kg)/no</th>
<th>Damage/rotten Qty (kg)/no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mango</td>
<td>43</td>
<td>708</td>
<td>21</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Jackfruit</td>
<td>92</td>
<td>3613</td>
<td>33</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Banana</td>
<td>45</td>
<td>450</td>
<td>15</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Papaya</td>
<td>82</td>
<td>1450</td>
<td>8</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Olive</td>
<td>31</td>
<td>308</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Coconut</td>
<td>21</td>
<td>548</td>
<td>4</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>

Homestead agro-forestry information

On an average, ten to twelve different agro-forestry trees were found in most of the homestead of the FSRD site. Jackfruit, mango, betel nut, black berry, bel, lemon, mehagoni, pummelo, olive, coconut etc were the most common trees in homestead agro-forestry system. Average higher number of trees was betel nut (24), mehagoni (12), jackfruit (9) and mango (3), respectively (Table 16).

Table 16. Homestead agro-forestry information of sample farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Name of tree species</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Jackfruit</td>
<td>9</td>
</tr>
<tr>
<td>2.</td>
<td>Mango</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Betel nut</td>
<td>24</td>
</tr>
<tr>
<td>4.</td>
<td>Black berry</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Bel</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Lemon</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Mehagoni</td>
<td>12</td>
</tr>
<tr>
<td>8.</td>
<td>Pummelo</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>Olive</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>Coconut</td>
<td>2</td>
</tr>
<tr>
<td>11.</td>
<td>others</td>
<td>4</td>
</tr>
</tbody>
</table>

Crop production and disposal pattern

The farmers of the FSRD site under Mymensingh during 2017-18 produced 6241 kg rice and its value was Tk. 123158. Most of the rice were sold (4686 kg) and earned Tk. 91257 from them. They were consumed (1846 kg) and few were distributed to relatives or neighbor (Table 17). Some farmers produced wheat (450 kg) and got Tk 11330 which they consumed only 50 kg and rest were sold by Tk.10800. Some farmers of the study area cultivated turmeric a sum of 309 kg and earned Tk 3835 and those were sold 259 kg or consumed (40 kg) by them.

Table 17. Average crop production and disposal pattern at FSRD site, Char Kharicha, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Types of crops</th>
<th>Total production Qty (kg)</th>
<th>Consumption Qty (kg)</th>
<th>Sold Qty (kg)</th>
<th>Distribution Qty (kg)</th>
<th>Damage/rotten Qty (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>6241</td>
<td>123158</td>
<td>1846</td>
<td>36236</td>
<td>4686</td>
</tr>
<tr>
<td>Wheat Others</td>
<td>450</td>
<td>11330</td>
<td>50</td>
<td>1250</td>
<td>400</td>
</tr>
<tr>
<td>(Turmeric)</td>
<td>309</td>
<td>3835</td>
<td>40</td>
<td>500</td>
<td>259</td>
</tr>
</tbody>
</table>

Agronomic management practices of field crops by the Sample farmers

The agronomic management practices include variety, seeding date, transplanting date and proper harvesting date (Table 18). Boro rice was cultivated with high yielding variety and proper seeding and harvesting time. Some farmers cultivate T.aman rice with HYV and local variety in respective
transplanting and harvesting time. All types of summer vegetables they usually use HYV with respective seeding and harvesting practices.

Table 18. Agronomic management practices of different field crops of the sample farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Crops</th>
<th>Variety</th>
<th>Seeding date</th>
<th>Transplanting date</th>
<th>Weeding (no)</th>
<th>Harvesting date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taman</td>
<td>Pajam/ Aloy</td>
<td>10-25 Jun</td>
<td>15 July-15 Aug</td>
<td>1</td>
<td>05-20 Nov</td>
</tr>
<tr>
<td>Wheat</td>
<td>BARI Gom-26</td>
<td>15-20 Nov</td>
<td>-</td>
<td>-</td>
<td>10-20 Mar</td>
</tr>
<tr>
<td>Potato</td>
<td>BARI Alu-25</td>
<td>10 Oct-20 Nov</td>
<td>-</td>
<td>1</td>
<td>10 Dec-15 Jan</td>
</tr>
<tr>
<td>Sweet gourd</td>
<td>Hybrid</td>
<td>September</td>
<td>October</td>
<td>2</td>
<td>Feb-Mar</td>
</tr>
<tr>
<td>Bitter gourd</td>
<td>Hybrid</td>
<td>September</td>
<td>October</td>
<td>2</td>
<td>Jan-Feb</td>
</tr>
<tr>
<td>Ash gourd</td>
<td>Hybrid</td>
<td>March</td>
<td>April</td>
<td>3</td>
<td>June to July</td>
</tr>
<tr>
<td>Snake gourd</td>
<td>Hybrid</td>
<td>March</td>
<td>April</td>
<td>2</td>
<td>June to July</td>
</tr>
<tr>
<td>Turmeric</td>
<td>local</td>
<td>April</td>
<td>-</td>
<td>-</td>
<td>Feb-Mar</td>
</tr>
</tbody>
</table>

Sources of inputs used by Sample farmers

The farmers of the study area were used inputs from different sources for crop production. It was observed that 10% farmers use their own seed, 58% farmers purchase seed from market, 25% from BADC and only 7% collected seed from relatives or other farmers (Table 19). Fertilizers and pesticides were purchased from dealers of local market. Eighty percent farmers managed their irrigation from own ability and rest 20% from relative or other farmers. Most of the farmers (85%) used their own organic fertilizer and rest 15% collected from relatives or other farmers. On an average, 20% farmer used their own draft power while 80% farmers borrowed or bought it from relatives/other farmers. Forty percent farmer used their own labor and 60% depended on other source of labor. A different scenario was observed for agricultural tools where 70% farmers used their own agricultural tools and rest 30% depended on other sources.

Livestock inventory

The scenario of livestock per household of different categories at FSRD site under Mymensingh during 2017-18 is presented in Table 20. It was observed that every family of different categories reared local chicken (8.88/family) while no family did not rear exotic chicken. The farmers reared chicken for home consumption and sale. In case of goat the farmer reared it for sale of adult animals and the number of goat per farm family is more than one. The highest number of cattle was found in medium (2.62) followed by small (2.39) and marginal (1.17) farmers. The cattle reared by the farmers might be due to home consumption, sale of milk and sale of adult animals. Marginal farmers did not have any duck but had the highest number of pigeons (1.8). On an average, 0.22 duck and 0.99 pigeon were reared by per farm family for home consumption, sale of egg, young and adult animals.

Livestock production and disposal pattern

Farmers of FSRD site, Mymensingh reared cattle, chicken, duck and pigeon in their family. On an average, every farm family possessed 576 (Litre) milk and from it they got Tk. 32792. They sold (428 Litre) milk; some were consumed and distributed to others (Table 21). Every farm family reared chicken, duck and pigeon and got eggs from it, most of them are sold for earning money a few was consumed and a negligible are distributed to neighbor and relatives.

Sources of inputs used by sample farmers in livestock production

The farmers of the FSRD site took inputs from different sources of provider. It was observed that 50% farmer reared cattle from their own sources while rest 50% purchased it from the market (Table 22). Similarly for duck rearing they are dependent on their own source and market whereas for feed collection 60% farmers collected feed from own, 30% from market and a very few are dependent on...
relatives or other farmers. For treatment of livestock 50% took medicine from market while 40% got treatment from department of livestock. On an average 60% farmer gave labor of his own for their livestock rearing, a small number are dependent on relatives or other source of input.

Table 19. Sources of inputs used in crop, vegetables, fruits and timber production by the sample farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Item</th>
<th>% Sources of input used from</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Own</td>
</tr>
<tr>
<td>Seeds/Seedlings</td>
<td>10</td>
</tr>
<tr>
<td>Fertilizers</td>
<td>-</td>
</tr>
<tr>
<td>Pesticides</td>
<td>-</td>
</tr>
<tr>
<td>Irrigation</td>
<td>80</td>
</tr>
<tr>
<td>Organic fertilizers/FYM</td>
<td>85</td>
</tr>
<tr>
<td>Draft power</td>
<td>20</td>
</tr>
<tr>
<td>Labor</td>
<td>40</td>
</tr>
<tr>
<td>Agricultural tools</td>
<td>70</td>
</tr>
</tbody>
</table>

Table 20. Livestock inventory of sample farmer at FSRD site Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Assets</th>
<th>Marginal</th>
<th>Small</th>
<th>Medium</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken</td>
<td>8.38</td>
<td>9.85</td>
<td>8.40</td>
<td>8.88</td>
</tr>
<tr>
<td>Goat</td>
<td>2.27</td>
<td>0.75</td>
<td>0.62</td>
<td>1.21</td>
</tr>
<tr>
<td>Cattle</td>
<td>1.17</td>
<td>2.39</td>
<td>2.62</td>
<td>2.06</td>
</tr>
<tr>
<td>Duck</td>
<td>0</td>
<td>0.38</td>
<td>0.42</td>
<td>0.27</td>
</tr>
<tr>
<td>Pigeon</td>
<td>1.80</td>
<td>0.87</td>
<td>0.30</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Table 21. Average livestock production and disposal pattern at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Items</th>
<th>Total production Qty (No./kg)</th>
<th>Total production Value (Tk)</th>
<th>Consumption Qty (kg)</th>
<th>Consumption Value (Tk)</th>
<th>Sold Qty (kg)</th>
<th>Sold Value (Tk)</th>
<th>Distribution Qty (kg)</th>
<th>Distribution Value (Tk)</th>
<th>Died/stolen Qty (kg)</th>
<th>Died/stolen Value (Tk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>576</td>
<td>32792</td>
<td>135</td>
<td>6550</td>
<td>428</td>
<td>25613</td>
<td>13</td>
<td>629</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chicken</td>
<td>19</td>
<td>4867</td>
<td>4</td>
<td>1067</td>
<td>12</td>
<td>3008</td>
<td>1</td>
<td>96</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>Egg</td>
<td>47</td>
<td>472</td>
<td>16</td>
<td>161</td>
<td>29</td>
<td>286</td>
<td>3</td>
<td>25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Duck</td>
<td>3</td>
<td>600</td>
<td>1</td>
<td>200</td>
<td>2</td>
<td>400</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pigeon</td>
<td>4</td>
<td>600</td>
<td>1</td>
<td>150</td>
<td>2</td>
<td>300</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>150</td>
</tr>
</tbody>
</table>

Livestock health management information

It was observed that 50% farmer collected vaccine from DLS, 30% from village trained people, and rest 20% from medicine seller. Similarly source of vaccination used for goat, chicken and duck. For vaccination of pigeon 100% information took from department of livestock (Table 23).

Table 22. Sources of inputs used in livestock production by sample farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Item</th>
<th>% Sources of input used from</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Own</td>
</tr>
<tr>
<td>Cattle</td>
<td>50</td>
</tr>
<tr>
<td>Chicken</td>
<td>40</td>
</tr>
<tr>
<td>Ducks</td>
<td>45</td>
</tr>
<tr>
<td>Feed</td>
<td>60</td>
</tr>
<tr>
<td>Medicine</td>
<td>10</td>
</tr>
<tr>
<td>Labour</td>
<td>60</td>
</tr>
</tbody>
</table>

Fish production: Generally, rui, katla, mrigel, carpio, sarputi, mirror carp, grass carp and pangus are the most common fishes in the study area. Average pond size at FSRD site was 22.50 decimal. The farmers harvested 269.33 kg fish per farm year. Those fishes were mostly used for home consumption (Table 24).
Sources of inputs used by sample farmers in fish production

The farmers of FSRD site took suggestions from different sources of provider. The farmer or any other of his relatives did not know any information about liming in the pond. At FSRD site, 100% farmers were completely dependent on traders of the market for liming and feed while 100% took information on fingerlings from relatives or others farmers (Table 25). It was observed that 100% farmer supplied water to the pond from his own management. For catching fish, 40% farmers involved their own net while 40% borrowed from relatives or other farmers and rest 30% lend it from traders of market instead of money. Most of the farmer gave their own labor for fish production but few (30%) are engaged other farmer for fish cultivation.

Table 23. Sources of vaccination used in livestock health management by the farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Animal type</th>
<th>% Sources of vaccination used from</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DLS</td>
</tr>
<tr>
<td>Cattle</td>
<td>50</td>
</tr>
<tr>
<td>Goat</td>
<td>40</td>
</tr>
<tr>
<td>Chicken</td>
<td>45</td>
</tr>
<tr>
<td>Ducks</td>
<td>50</td>
</tr>
<tr>
<td>Pigeon</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 24. Status of fish cultivation by the farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Average pond size (dec)</th>
<th>Name of fish</th>
<th>Average production (kg/farm/yr.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>22.5</td>
<td>Rui</td>
<td>24.53</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Katla</td>
<td>14.50</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>Mrigel</td>
<td>19.25</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>Carpio</td>
<td>22.25</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td>Miror carp</td>
<td>11.60</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td>Silver carp</td>
<td>37.15</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td>Telapia</td>
<td>35.40</td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td>Pangus</td>
<td>73.50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>269.33</td>
</tr>
</tbody>
</table>

Per farm credit received and purpose of credit

The farmers of FSRD site of Mymensingh sometimes received credit from NGO, Krishi bank or some of their friends or relatives. This might be due to fact that farmers of Bangladesh are not always solvent to purchase the inputs for crop production. Hence, the farmers of the study area took credit (2500 Tk) with the interest of 12% from friends or relatives for crop production (Table 26). Some were received credit from non government organization with high interest (15%). While on an average, farmers received Tk 62916 from Krishi bank for crop and fish production and someone to repay the previous loan with the interest of 10%.

Table 25. Sources of inputs used in fish production by sample farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Item</th>
<th>% sources of input used from</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Own</td>
</tr>
<tr>
<td>Lime</td>
<td>-</td>
</tr>
<tr>
<td>Fingerlings</td>
<td>-</td>
</tr>
<tr>
<td>Feed</td>
<td>10</td>
</tr>
<tr>
<td>Net</td>
<td>40</td>
</tr>
<tr>
<td>Water supply</td>
<td>100</td>
</tr>
<tr>
<td>Labour</td>
<td>70</td>
</tr>
</tbody>
</table>

Income and livelihood of the sample farmers

The amount of money or its equivalent received during a period of time in exchange for labor or services, from the sale of goods or property, or as profit from financial investments. Average per farm income (Tk) of the sample farmers in the year 2017–18 have been shown in the Table 27. The items of income were categorized by crop, livestock, fisheries, poultry, homestead, agro forestry, off farm and
nonfarm. In case of landless and marginal farm, non-farm income was higher compared to farm income. Contrary, in case of small, medium and large farm, farm income was higher compared to non-farm income.

Table 26. Per farm average credit received from different sources and purpose of credit at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Sources of credit</th>
<th>Amount of credit (Tk)</th>
<th>Purpose of credit</th>
<th>Rate of interest (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends/relatives</td>
<td>2500</td>
<td>Crop production, fish production, repay</td>
<td>12</td>
</tr>
<tr>
<td>NGO</td>
<td>1250</td>
<td>production, repay</td>
<td>15</td>
</tr>
<tr>
<td>Krishi bank</td>
<td>62916</td>
<td>previous loan etc.</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 27. Per farm income and livelihood of different categories of farmers at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Main source of income</th>
<th>Landless</th>
<th>Marginal</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops</td>
<td>890</td>
<td>17796</td>
<td>30794</td>
<td>67956</td>
<td>117956</td>
</tr>
<tr>
<td>Vegetables</td>
<td>290</td>
<td>1517</td>
<td>12413</td>
<td>18789</td>
<td>28790</td>
</tr>
<tr>
<td>Fruits</td>
<td>120</td>
<td>1250</td>
<td>2315</td>
<td>7288</td>
<td>7288</td>
</tr>
<tr>
<td>Livestock production</td>
<td>3520</td>
<td>19365</td>
<td>37375</td>
<td>49700</td>
<td>49700</td>
</tr>
<tr>
<td>Fish production</td>
<td>0</td>
<td>3000</td>
<td>17630</td>
<td>20635</td>
<td>21635</td>
</tr>
<tr>
<td>Agro-Forest product</td>
<td>0</td>
<td>0</td>
<td>2500</td>
<td>3790</td>
<td>4790</td>
</tr>
<tr>
<td>Business-shop, trade etc</td>
<td>24590</td>
<td>15000</td>
<td>12380</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Others (auto, van &amp; day labour)</td>
<td>35320</td>
<td>36000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>64730</td>
<td>93,928</td>
<td>115,407</td>
<td>1,68,158</td>
<td>2,30,159</td>
</tr>
</tbody>
</table>

Service provided for crop production from different organization

Eight types of services were provided by different service provider at FSRD site. Highest service for crop production was provided by other farmer or relatives (37.50). On an average, Department of Agricultural Extension (DAE) provided 19.37% service in different cases of service while electric media provided the lowest (100%) information. A few farmers took service from research institute (14.71%) and traders took part of some services (16%) as new variety, seed rate, fertilizer application and pest management (Table 28).

Table 28. Service provided for crop production from different organizations at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Services provided</th>
<th>Farmers/relatives</th>
<th>Electric media</th>
<th>Demo</th>
<th>Research</th>
<th>DAE</th>
<th>Traders</th>
</tr>
</thead>
<tbody>
<tr>
<td>New variety of seed</td>
<td>30</td>
<td>10</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Seed rate</td>
<td>30</td>
<td>-</td>
<td>20</td>
<td>10</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Fertilizer application</td>
<td>40</td>
<td>-</td>
<td>10</td>
<td>15</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>Pest management</td>
<td>30</td>
<td>5</td>
<td>12</td>
<td>18</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Irrigation</td>
<td>40</td>
<td>10</td>
<td>10</td>
<td>15</td>
<td>25</td>
<td>-</td>
</tr>
<tr>
<td>Harvesting time</td>
<td>50</td>
<td>10</td>
<td>15</td>
<td>15</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Processing and storing</td>
<td>40</td>
<td>5</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Market information</td>
<td>40</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Average</td>
<td>37.50</td>
<td>10</td>
<td>14.57</td>
<td>14.71</td>
<td>19.37</td>
<td>16.00</td>
</tr>
</tbody>
</table>

Service provided for livestock production from different organization

For livestock production seven kinds of services were provided from five types of provider at FSRD site, viz. about new breed of livestock, housing, feed and water management, suggestion about breeding, diseases, vaccination and market information These services were provided by relatives or other farmers, electric media, research institute, Department of livestock and traders. At FSRD site, farmers took most of their suggestion from relatives or other farmers (37.14%) followed by DLS those who provided (31.42%) service in different types. On the other hand, research institute gave suggestions a service (15%) and electric media provided the lowest service (10%) to the farmer as well (Table 29).
Service provided for fish production from different organization

At FSRD site, farmers took suggestion for fish production from their relatives or other farmers, research institute, Directorate of fisheries, some of from traders and a very small from electric media. The highest suggestions took from other farmers or relatives (36.87%) followed by traders (28.33%) and DoF (21.88%) while electric media provided a small service (8.67%) to the farmers. Traders took part a great service to the farmers by giving suggestion on new breed, feeding management, diseases, harvesting, carrying and information on marketing (Table 30).

Table 29. Service provided for livestock production from different organizations at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Services provided</th>
<th>Service provider (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Relatives/Farmers</td>
</tr>
<tr>
<td>New breed of livestock</td>
<td>50</td>
</tr>
<tr>
<td>Housing</td>
<td>70</td>
</tr>
<tr>
<td>Feed and water management</td>
<td>45</td>
</tr>
<tr>
<td>Breeding</td>
<td>40</td>
</tr>
<tr>
<td>Diseases</td>
<td>35</td>
</tr>
<tr>
<td>Vaccination</td>
<td>10</td>
</tr>
<tr>
<td>Market information</td>
<td>10</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>37.14</td>
</tr>
</tbody>
</table>

Table 30. Service provided for fish production from different organizations at FSRD site, Mymensingh during 2017-18

<table>
<thead>
<tr>
<th>Services provided</th>
<th>Service provider (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Farmers/relatives</td>
</tr>
<tr>
<td>New breed of fish</td>
<td>30</td>
</tr>
<tr>
<td>Pond management</td>
<td>50</td>
</tr>
<tr>
<td>Feeding management</td>
<td>30</td>
</tr>
<tr>
<td>Diseases</td>
<td>20</td>
</tr>
<tr>
<td>Breeding</td>
<td>40</td>
</tr>
<tr>
<td>Fish harvesting</td>
<td>55</td>
</tr>
<tr>
<td>Carrying/preservation</td>
<td>40</td>
</tr>
<tr>
<td>Market information</td>
<td>30</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>36.87</td>
</tr>
</tbody>
</table>

Problem faced by the farmers

Farmers were asked about the problems of crop, livestock and fisheries and they answered more than 25 problems. These problems summarized and 9 problems have been showed in Table 31. They showed Lack of knowledge about new crop variety/technology was the main problems of the farmer followed by high price of inputs, lack of knowledge about fish feed and pond management, lack of quality seeds/fingerlings/duck links, lack of credit facility, lack of knowledge about homestead vegetables production, lack of knowledge about vaccination, de-worming, feed of livestock and poultry, Infestation of insect/pests/weeds and lack of cash money for buying inputs.

Table 31. Problems faced by the farmers in the study area

<table>
<thead>
<tr>
<th>Problems</th>
<th>% farmers</th>
<th>Solution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of knowledge about new crop /technology</td>
<td>88</td>
<td>Demonstration, Training, Field day</td>
</tr>
<tr>
<td>Lack of quality seeds / fingerlings / duck links</td>
<td>77</td>
<td>Education, Information/ Training</td>
</tr>
<tr>
<td>Lack of cash money for buying inputs</td>
<td>69</td>
<td>Easy credit system</td>
</tr>
<tr>
<td>Lack of knowledge about fish feed and pond management</td>
<td>85</td>
<td>Demonstration, Training, Field day</td>
</tr>
<tr>
<td>Lack of knowledge about vaccination, deworming, feed of livestock and poultry</td>
<td>90</td>
<td>Demonstration, Training</td>
</tr>
<tr>
<td>Lack of credit facility</td>
<td>75</td>
<td>Easy credit system</td>
</tr>
<tr>
<td>Lack of knowledge about homestead vegetables production</td>
<td>75</td>
<td>Demonstration, Training, Field day</td>
</tr>
<tr>
<td>High price of inputs</td>
<td>80</td>
<td>Increase subsidy in agricultural inputs</td>
</tr>
<tr>
<td>Infestation of insect/pests/weeds</td>
<td>70</td>
<td>Increase knowledge by training</td>
</tr>
</tbody>
</table>
IV. Conclusion

There is enough scope of improvement by imposing appropriate technologies in the study area for the resource poor farm households. Effort should be taken to increase production through integration of various production subsystems in agriculture for efficient utilization of resources. It would maximize production of diversified products from a minimum area which will increase the income of the farmers and would enhance food production. Livestock, fisheries and other off-farm activities should be strengthened for improvement of farmers’ livelihood. Measure should be taken for improvement of soil health, quality seed supply for crops and quality feed for livestock and fisheries. Agricultural input should be made available to the farmers to boost up crop production. In the conclusion it can be said that the integrated farming system is technically feasible and economically viable in Bangladesh. Extensive efforts should be made to transfer this technology among the farmers.

Acknowledgements

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V. References


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