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Accelerating Agriculture Productivity Improvement (AAPI)

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Participatory Rural Appraisal (PRA) Report for Sadullahpur Village of Roypur Union Bagherpara Upazila Jessore District

June 2012

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Accelerating Agriculture Productivity Improvement (AAPI)

Participatory Rural Appraisal (PRA) Report for Sadullahpur Village of Roypur Union

Village Overview - Summary

The Accelerating Agriculture Productivity Improvement (AAPI) project has scaled up to include the United States Agency for International Development (USAID) Feed the Future (FtF) priority Upazilas in Bangladesh. The scale-up activities will continue to focus on fertilizer deep placement (FDP) technology, use of good seed and, where feasible, alternate wetting and drying (AWD) technology. In addition, effective with the scale-up, the AAPI implementation strategy will be enhanced to include a model village concept to accelerate improvements in farm production systems with added attention given to crop diversification (based upon comparative advantage factors), improved access to quality seeds and post-harvest/value chain improvement.

To facilitate the selection of model village farmers and the determination of interventions, a Participatory Rural Appraisal (PRA) was conducted in the Sadullahpur village of the Roypur union of the Bagherpara upazila under the Jessore district. The village is within the bounds of the AAPI project. The overall objective of the PRA was *to provide detailed information that will be used to support strategic interventions that will contribute to improved livelihood opportunities of landless/functionally landless, marginal, small and medium farmers; 100 percent adoption of FDP technology is targeted*. Five categories of farmers were examined (landless, marginal, small, medium and large) in exercises using different tools. The PRA exclusively dealt with the members of landless, marginal and small farmers. Fifteen members actively participated in the PRA exercise. The following village profile was revealed by the PRA:

- Sadullahpur is served by both metallic and katcha roads.
- The village has one daily small market, eleven shallow tube wells, four mosques and one integrated pest management (IPM) club.
- There are 84 small ponds in the village (seasonal, for fish culture only. Not for irrigation).
- The average family size is 5.14. Average homestead areas range from 6.6 – 7.76 decimals for landless/marginal farmers to 12-18 decimals for small and medium farmers. There are no large farmers in the village.
- Average monthly income varies with category. Landless farmers have little or no cultivated land and generate income from paid employment. However, they have little or

no production for home consumption. Marginal and small farmers actually make less cash income per month but supplement their income with their farm products for home consumption. Medium farmers have income from the sale of surplus farm production.

- There are no financial banks located in the village.
- The village has 155 households, 61 hectares (ha) of cultivated land, and the cropping intensity is 265 percent.
- The tenure pattern shows that it is dominated by owners and tenant farmers.
- There are 12 women-headed farm households in the village.
- Most of the villagers are farmers (74 percent) who are engaged in crop-livestock-fisheries-homestead plantations (livestock, fisheries and crops) and follow traditional homestead plantation farming systems.
- Key crops grown in the village include rice (transplanted Aus, T. Aman and Boro), brinjal and vegetables such as cabbage, cauliflower, tomato, radish, lalshak (red amaranth), cucumber, mustard, mungbean and lentil.
- Inorganic (N, P, K and S) and organic (manure) fertilizers are applied to all crops. *Guti* urea is being used on about 35 ha or 36% of total rice land and 1 ha of vegetables.
- Most of the farmers sell their products in the local markets. Among the major trees in the homestead plantation are date palm, mehagani, shisu, koroi, rain tree, and bamboo. Fruit-bearing trees are mainly mango, jackfruit, jujube, papaya, guava, pomelo (*Jambura*) and banana. The livestock population consists of cattle which are generally reared at the household level (cut and carry feed).
- Men are involved in almost all of the field activities in crop production. Women are involved in most activities related to vegetable production and carry out most rice post-harvest activities; they are almost exclusively responsible for seed preservation.

The people of Sadullahpur observed that agriculture drives village development. They understood that they have been locked into a traditional, subsistence system and are looking to modern technology to move toward improved livelihoods. The lack of infrastructure, markets and services was viewed as a constraint to commercial agriculture and largely out of their control. However, the villagers did recognize that they can take action to increase yields to ensure food security and then produce a surplus for sale. They saw there were a number of reasons why they have not been able to increase yields and these related to lack of knowledge. Lack of access to better quality inputs, particularly seeds, was seen as a constraint. There was a strong interest in the balanced use of fertilizer and working with cropping patterns to manage the soil and maximize production.

Marketing was viewed as a major constraint to commercial farming. All farmers are price takers and depend on middlemen for links to the market. They are without price information and linkages to markets. Price information was seen as particularly critical for the production of high-value crops. This becomes most critical for vegetable production and the village is well-suited to vegetable production. However, current production is only for home consumption with a small surplus sold locally. There is interest in commercial vegetable production, but skills and knowledge are needed to fit a high-value vegetable crop into the cropping systems.

The PRA findings suggest that there is scope for crop intensification and diversification as well as obtaining higher yields using deep placed *Guti* urea for higher N use efficiency instead of broadcast prilled urea. There is a need to introduce a short duration transplanted Aman variety to allow early establishment of vegetables such as cabbage, cauliflower, tomato and brinjal using *Guti* urea to obtain higher yields and return. Input supply is critical for all production systems and a whole-village approach will allow entrepreneurs to engage in seed production, balanced fertilizer supply, better water management and judicious use of pesticides. There is a need for greater extension service centering on hybrid/high-yielding variety (HYV) and good quality seeds, fertilizer and irrigation technology at low cost. Training is critical to meet the demand for skills and knowledge on modern farming technologies. Efforts at expansion of income from different sources such as livestock, fisheries and homestead gardens need to be organized. In this regard, soft loan facilities would benefit agriculture production but need to be coupled with training on farming as a business to enable those wishing to invest in modern technologies to have access to the resources and the capacity to make a return on that investment. For all production, the village needs to establish links to commercial markets where they can receive price information. Such information combined with group marketing would enhance their bargaining power when selling produce.

Accelerating Agriculture Productivity Improvement (AAPI)

Participatory Rural Appraisal (PRA) Report for Sadullahpur village of Roypur Union

Background

The Accelerating Agriculture Productivity Improvement (AAPI) project is a five-year project, funded by the United States Agency for International Development (USAID) with objectives to improve food security and accelerate income growth in rural areas by increasing agricultural productivity on a sustainable basis. The International Fertilizer Development Center (IFDC) is implementing the project to promote improved nutrient use management (including rapid diffusion of fertilizer deep placement [FDP] technology and balanced use of fertilizer), good quality seed and efficient water management in rice, vegetable and fruit crops in 22 districts. Twenty of the districts are in the south and southwest of Bangladesh and align with the USAID Feed the Future program. In accordance with its endeavor to strengthen and re-orient agricultural production systems, AAPI has adopted an approach, among others, to work with a whole village community. The intent is to apply a farming systems approach with all farmers in the village participating, including active participation of the village women. Using Participatory Rural Appraisal (PRA) methodology, AAPI will identify the village goals that will be used to direct project activities and linkages with other service providers. The intent is to establish these villages as models for development.

The second model village to be identified in the program is Sadullahpur of Roypur union, Bagherpara upazila, under Jessore district. The PRA was undertaken from February 13 to 16, 2012 to assess the farming systems, crops and cropping patterns, fertilizer use, women's access to resources and participation in agricultural activities, farmers' perception on existing crop production practices, livelihood strategies and the agro-ecological situation. It also helped the community to identify opportunities that are necessary to be explored for improving livelihoods. This is intended to provide a basis for sustainable actions necessary to effect changes in crop production.

Goal

The goal of the PRA was to *provide detailed information that will be used to support strategic interventions that will contribute to improved livelihood opportunities of landless/functionally landless, marginal, small and medium farmers*. The PRA is intended

to support interventions that accelerate the impact of the AAPI project and extend the project benefits on a whole village basis. Whole village adoption will support sustainability of progress made under AAPI.

Objectives

The primary objective of the PRA was to collect field-level data and identify the perception of the farmers with regard to interventions to enable small, marginal and landless farm families to increase their income through maximum adoption of the FDP technology, farming system development and rural enterprises. The study identified income-earning opportunities within the village, crop production and diversification, homestead gardening for family food and nutrition, soil fertility management for sustainable production and efficient use of resources (land, labour and capital) and inputs (fertilizer, seed and water).

Specific objectives of the PRA include:

- Identify the existing farming systems which are practiced in the village.
- Describe the various farming activities for crop production.
- Record the existing technology used by different categories of farmers (marginal, small and medium), constraints and the need for improvement.
- Record the existing food in-take pattern by different categories of farmers (landless, marginal, small medium), and the need for improvement.
- Determine the cost and return of different crop production.
- Define gender-related issues relating to crop production.
- Determine the environmental issues related to irrigated crop production.
- Identify the links between farm production and markets.
- Examine the potential for improving the farming systems to increase productivity by adopting FDP technology, and the resulting increase in income.
- Identify the constraints and problems faced by the farmers in crop production and other agricultural activities and the remedial measures required to overcome the problems.

Selection of the PRA Village

The Sadullahpur village has been selected by the AAPI project in consultation with Deputy Director of DAE Jessore and Bagherpara upazila officials of DAE and in recognition

of the high level of interest of village farmers as well as the level of agricultural diversity in the village.

Selection Criteria of the PRA Participants

Criteria for the selection of PRA participants were derived in consultation with upazila level officials of DAE and the Chairman, Secretary and women members of the Integrated Pest Management (IPM) club and village doctor (who is a progressive farmer and leader of the community).

Identification of Target Groups

The target group for the PRA was defined by the different categories (five categories) of farmers based on land holdings. This was used as an indicator of livelihood and income. The household target group categories are shown below.

Table 1. Five Categories of Target Farmers

| Category | Type of Farmer | Definition and Target Number | Number of Households |
|-------------------------------|--|--|----------------------|
| Category 1 | Landless/Functionally landless | Those who have own land below 5 decimals | 30 |
| Category 2 | Marginal farmers (including homestead) | Those who own land 5 to 49 decimals | 25 |
| Category 3 | Small farmers (including homestead) | Those who own land 50 to 249 decimals | 84 |
| Category 4 | Medium farmers (including homestead) | Those who own land 250 to 749 decimals | 16 |
| Category 5 | Large farmers (including homestead) | Those who own land above 750 decimals | 0 |
| <i>Total Household</i> | | | 155 |

Source: Department of Agricultural Extension (DAE) and the participants of the PRA team.

PRA members were selected from the four categories listed above from the different corners of the village. Farmers were chosen who have a clear idea of the village structure, cultivable land, crops and crop pattern, income of individual families, cattle and homestead plantation. The list is shown in **Annex I**.

PRA Activities

| Activities | Hours | | | | | | | |
|---|-------|----|----|----|----|----|----|----|
| | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Day 1 (February 13, 2012) | | | | | | | | |
| Met the Agriculture officer of Bagerpara upazila & discuss the tools of PRA exercises | ■ | ■ | | | | | | |
| Appraise the participants about PRA & its objectives | | | ■ | | | | | |
| Conduct the village walk for the transect | | | | ■ | ■ | | | |
| Lunch and prayer | | | | | | ■ | | |
| Prepare the physical sketch of the village | | | | | | | ■ | |
| Conduct validation of the findings with the participants and the perception of farmers (men & women separately) | | | | | | | | ■ |
| Day 2 (February 14, 2012) | | | | | | | | |
| Conduct seasonal calendar | ■ | ■ | ■ | | | | | |
| Conduct Social Map of the village | ■ | ■ | ■ | | | | | |
| Lunch and prayer | | | | | ■ | | | |
| Conduct Venn Diagram & Wealth Ranking | | | | | | ■ | ■ | |
| Conduct validation of the findings with the participants and the perception of farmers (men & women separately) | | | | | | | | ■ |
| Day 3 (February 15, 2012) | | | | | | | | |
| conduct Village Soil fertility grade mapping | ■ | ■ | ■ | | | | | |
| Conduct Production flow chart | ■ | ■ | ■ | ■ | | | | |
| Lunch and prayer | | | | | ■ | | | |
| Conduct validation of the findings with the participants and the perception of farmers (men & women separately) | | | | | | ■ | ■ | ■ |
| Day 4 (February 16, 2012) | | | | | | | | |
| Women participation in crop production | ■ | ■ | ■ | | | | | |
| Focus group discussion (Nutrition intake, input use & marketing) | | ■ | ■ | ■ | | | | |
| Lunch and prayer | | | | | ■ | | | |
| Conduct validation of the findings with the participants and the perception of farmers (men & women separately) | | | | | | ■ | ■ | ■ |

Figure 1. Program of Activities for Conducting PRA in Sadullahpur Village

Description of Activities

Orientation of Participants and Village Mobilization

Orientation of participants and village mobilization are considered to be activities of utmost importance in any PRA study. Fifteen participants were in the orientation session including seven women farmers (representatives from different farm categories) who were actively involved in all of the PRA exercises. Participating farmers were briefed on the goals, objectives and scope of opportunities in the field of agricultural development and diversification. While undertaking this activity, active cooperation and assistance were sought and obtained from relevant Upazila Agriculture Officer and Sub-Assistant Agriculture Officer of DAE and local leaders (community leader, IPM club chairman, secretary and women IPM club members).

The selected farmers committed to assist the PRA team in all the exercises. It was emphasized that free and open discussions on constraints and problems that they face and their own perception about remedial measures would be necessary to assist with identifying appropriate interventions that would change their livelihoods and ensure food security. To document their perceptions, focus group discussions were held at the end of each day; men and women separately.

Transect Walks

The transect walks were designed to help the enumerators to learn more about the environmental, economic and social resources of the village. The major objectives of the transect were to identify the terrain, soil types, soil fertility status, land use for crops grown in the area, vegetation, cropping and livestock systems.

Two mixed groups (men and women) were organized. One group focused on agriculture: soils, land use and cultivation and cropping patterns. The second group focused on farming systems: crop-homestead plantation system, crop-homestead plantation and livestock system, crop-livestock system and crop-livestock-fish culture. The second group also focused on infrastructure, housing and services.

Participants were asked to join different groups with PRA team members for separate transect walks to show the areas of greater importance to them. Following the walks, the groups shared the information with one another and constructed the transect diagram together.

Social Map

In order to learn about the social structure of the village, the PRA team organized discussions with the participants. The social map was made on large sheets of paper using different colored pens to mark paths and other landmarks including homesteads, schools, the college, tube wells, ponds, mosque, etc. The village was sub-divided into *para*, which are sufficiently small and located to enable the available informants to provide accurate information. The participants drew the social map to show the location of institutions and other landmarks. The map is shown in **Figure 2**.

Venn Diagram

The Venn diagram was used to help the PRA team determine the villagers' perceptions relating to importance of local institutions. The diagram was traced on a large flip chart. The participants were asked to list the local groups and organizations that are most important to them. The Venn diagram included information on the sources of basic literacy, health and sanitation, agricultural extension services, livestock services and future training needs for participants. The diagrams are shown in **Figure 8-10**.

Focus group discussion

The focus group discussion was held at the end of each day for men and women, grouped separately. It helped validate the information collected by the PRA team. It also obtained opinions and perceptions, relating to access and control over resources, decision making, social barriers and constraints, involvement in agricultural field, crops and cropping patterns, cropping intensity & farming systems and production, input use, food habits, health, access of education, access in marketing, natural hazards, seasonal calendar, time-line, production flow chart, factors affecting crop production, gender participation for T. Aman and Homestead Gardening etc. and future training needs. The information is reported in PRA findings.

Seasonal Calendar

The seasonal calendar was prepared with the assistance of the PRA team using color pens on large sheets of paper. It included information on cropping patterns, time of planting and harvesting. This is shown in **Table 6**.

Timeline

The PRA team organized a separate focus group discussion with the participants to collect information on factors affecting crop production, historic time line of major crop interventions and changes of crops, equipments and technologies every 10 years. This included trends toward modern varieties of seeds, fertilizer use, pest management, irrigation, agricultural machineries, etc. This is reported in **Table 10**,

Table 11 and Table 12.

Production Flow Chart

The production flow chart was prepared by the PRA team in consultation with villagers to learn about the status of the production systems, problems and solutions on irrigated/rainfed crop production, production-marketing linkages, seed quality and gender participation in crop production (**Figure 3 & Figure 4**). Three separate groups (mixed male/female) were organized for this purpose.

Income Streams

The participants made a list of sources of income from various agricultural activities. They then divided the village into the household categories described in **Table 1**. They then estimated the number of farmers within each category, the value of the income source and estimated their average income. This is reported in **Table 17**. This helped to elicit and establish the factors that influence farmers when making judgments, choices and decisions. For example the landless farmers, who have no cultivated land might be more interested in livestock issues than medium farmers who are predominately cultivators of crops.

Village Soil Fertility Mapping

Researchers are recommending a flat fertilizer dose for a wide area on the basis of soil test results of certain neighboring fields and agro-ecological zone maps (BARC, Fertilizer Recommendation Guide, 2005). However, farmers have their own perceptions about soil fertility.

The objectives of village-level soil fertility mapping are to (1) understand the ability of farmers in recognizing spatial variability in soil fertility in their rice fields; (2) compare the farmers' perception of soil fertility with the laboratory soil test results; and (3) identify farmers' defined fertilizer management zones (FMZ) in the village and their fertilizer recommendations.

PRA Findings

PRA Village Physical Profile

Sadullahpur village under Roypur union is 21 kilometers from Jessore district headquarters and 3 kilometers (km) from the Bagherpara upazila headquarters. The access to

district headquarters is via a metallic and katcha road. Transport facilities are available from village to upazila and district head quarter.

Total population of Sadullahpur village is 798; 48 percent are female. There are 12 female-headed farm households. Additional information about Sadullahpur village is presented in **Table 2**.

Table 2. Physical Profile of Sadullahpur Village

| Item | Information |
|---------------------|--|
| Village boundary | North: Cultivable land South: Cultivable land & Dhupkhali village East: Indra village West: Sekherbathan village land |
| Total households | 155 |
| Total population | 798 (411 males and 387 females) |
| Average family size | 5.14 |
| Religion | 100% of families are Muslim |
| Mosque | 4 |
| River | No |
| Canal | No |
| Pond | 84 |
| Shallow tube wells | 20 |
| Metallic road | 1 |
| Katcha road | 1 |
| Daily market | 1 |
| Culvert | No |
| Tube wells | 45 (80% tube wells are arsenic contaminated) |
| Grave yard | 4 |
| Community clinic | No |
| ICM Club | 1 |

Source: PRA February 2012

Figure 2. Social Map of Sadullahpur village



Map drawn by the PRA team

LEGEND

Cultivated land



Pond



Metallic road



Katcha road



Graveyard



Tree



Tube well



Mosque



House



Timber & fruit trees



The main resources are cultivable land, timber trees, bamboo bushes, fruit trees and cattle. A few farmers have seasonal ponds and are cultivating fish. The farmers fully depend on shallow tube wells and rain water for cultivation of rice and vegetables

Soil Characteristics

The total agricultural land of this village is 61 hectares (ha). Three textural classes of soils exist: Sandy loam, loam and silt loam.

Topography

There are three types of land in this village. **Table 9** shows that most of the land is under the medium-high land category and covers about 75 percent of the total cultivable land. Other categories are high land and medium low land, which cover 20 percent and 5 percent, respectively.

Communication

Sadullahpur village is 21 km from Jessore district headquarters and 3 kilometers (km) from the Bagherpara upazila headquarters. The road from the town to the village is good but within the village all roads are katcha. There is a metallic road adjacent to the village. Transport facilities are available from village to upazila and district head quarters.

House Infrastructure

Most of the houses in the village have a tin roof and tin, bricks and muddy wall.

Temperature

Temperature fluctuations are high across the year. Minimum temperature prevails in the month of January and is about 12.8 - 13.2°C. Maximum temperature rises up to 38.5°C in the month of May. Hot air blows over the village from February to May.

Rainfall

The average annual rainfall of this village is 511 - 1267 millimeters (mm) and is distributed unevenly across the year. The average annual distribution of precipitation during 2006 to 2011 is shown in **Table 3**. It appears that the extent of rainfall has been decreasing over the last three years.

Table 3. Monthly Distribution of Precipitation (mm) at Sadullahpur Village during 2006 to 2011

| Month | Year | | | | | |
|--------------|-------------|-------------|-------------|------------|------------|--------------|
| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| January | 00 | 00 | 30 | 00 | 00 | 00 |
| February | 00 | 15 | 05 | 00 | 00 | 00 |
| March | 00 | 00 | 30 | 20 | 24 | 35.5 |
| April | 00 | 25 | 80 | 30 | 47 | 10 |
| May | 00 | 35 | 124 | 00 | 00 | 62 |
| June | 180 | 115 | 135 | 55 | 00 | 267 |
| July | 355 | 535 | 411 | 155 | 165 | 89 |
| August | 215 | 200 | 181 | 365 | 71 | 272 |
| September | 385 | 102 | 201 | 135 | 112 | 70 |
| October | 75 | 60 | 65 | 00 | 82 | 00 |
| November | 00 | 155 | 00 | 00 | 00 | 00 |
| December | 00 | 25 | 00 | 00 | 10 | 00 |
| Total | 1210 | 1267 | 1262 | 760 | 511 | 805.5 |

Source: Upazila Agriculture Officer, Bagherpara, Jessore

Educational Status

Almost 75% of the village is educated to JSC level, another 23% up to HSC. Up to HSC level, the number of educated females is higher compared to males. For the remaining 2% with Degree and above, males are dominating. Details are shown below.

Table 4. Educational Status of Sadullahpur Village of Bagerpara

| MA/MSS | | BA/BSS | | HSC | | SSC | | JSC | | PSC | |
|--------|--------|--------|--------|------|--------|------|--------|------|--------|------|--------|
| Male | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male | Female |
| 03 | - | 10 | 02 | 16 | 25 | 33 | 42 | 71 | 110 | 99 | 102 |
| 03 | | 12 | | 41 | | 75 | | 181 | | 201 | |

Source: PRA February 2012

Land Use Data

The village lies under the Higher Ganges River Floodplain (AEZ – 11) having soils on a stable landscape and predominantly calcareous soil. **Annex IV** lists the cereals, vegetables, pulses and oil crops that are cultivated in the village. Land use follows the cropping pattern. **Figure 3** also displays the land use.

Cropping Intensity and Farming Systems

The cropping intensity of the village is 265 percent, well above the national average (173 percent). The responses of the participants indicate that the majority of households

(44 percent) are engaged in crop-livestock-fisheries-homestead plantation systems followed by the crop-livestock-homestead plantation (30 percent) (**Table 5**).

Table 5. Farming Systems at the Village of Sadullahpur under Bagherpara Upazila

| Farming System | Number of Farmers | % of total |
|---|-------------------|------------|
| Crop-livestock-fisheries-homestead plantation | 68 | 44 |
| Crop-livestock-homestead plantation | 46 | 30 |
| Crop-fisheries-homestead plantation | 7 | 4 |
| Crop-homestead plantation | 9 | 6 |
| Homestead - livestock | 8 | 5 |
| Homestead – fisheries | 2 | 1 |
| Homestead | 15 | 10 |

Source: PRA February 2012

Cropping Area

The net cultivated area of the village is 61 ha, of which 21 ha is double cropped and 40 ha is triple cropped. The gross cropped area is 162 ha.

Major Crops with Varieties and Cropping Pattern

The main crop of the village is rice. Other important crops are vegetables, mustard, pulses, potato, lentil, guava, date palm, bamboo bushes, mango, jujube, litchi, banana and papaya. The seasonal calendar is presented in **Table 6**. The crops and varieties used by farmers are listed in **Table 7 and Table 8**. It was noted that earlier cropping patterns were simply centered on the Aus and Aman rice crops. Two rice crops (Aman and Aus) and pulses (lentil, munbgean and grass pea) were cultivated: Aman relayed grass pea; T. Aman – Lentil or Mustard -Lentil – Jute/Aus. In more recent times, there are now eight major cropping patterns, as described in **Table 6**.

Table 6: Cropping Patterns/ Seasonal Calendar of Sadullahpur Village, Bagerpara

| Cropping pattern | Baishak | Jhashatta | Ashar | Chraban | Vadra | Ashin | Kartik | Agraihan | Paush | Mag | Falgun | Chaitra |
|---|--------------|-----------|----------|---------|---------|-----------------------|---------|----------|-----------------|-------------|----------|---------|
| | Ap | May | June | July | August | September | October | November | December | January | February | March |
| Boro-Fallow-T.aman | Boro | | Fallow | | T. Aman | | | | | Boro | | |
| Mustard - Boro - T.aus | Boro | | T. Aus | | | | Mustard | | | Boro | | |
| Mustard-Sesame/Jute -T.aus | | | T. Aus | | | | Mustard | | | Sesame/Jute | | |
| Cabbage/Bottle gourd- Amaranth/Danta-Cucumber | | | Cucumber | | | Cabbage/ bottle gourd | | | Amaranth/ Danta | | | |
| Mustard-Sesame/Jute -T.aman | | | T. aman | | | | Mustard | | | Sesame/Jute | | |
| Mustard-Boro - T.aman | Boro | | T. aman | | | | Mustard | | | Boro | | |
| Brinjal - T.Aus | T. Aus | | | | Brinjal | | | | | | | |
| Mustard-Teasel gourd | Teasel gourd | | | | | Mustard | | | Teasel gourd | | | |

Table 7. Major Crops Grown by the Farmers of Sadullahpur Village

| Under Rainfed Condition | Under Irrigated Condition |
|-------------------------|---------------------------|
| i. Jute | i. Rice |
| ii. Lentil | ii. Mustard |
| iii. Mung bean | iii. Cucumber |
| iv. Mustard | iv. Cabbage |
| v. Sesame | v. Cauliflower |
| | vi. Tomato |
| | vii. Brinjal |
| | viii. Bitter gourd |
| | ix. Chilli |
| | x. Sweet gourd |
| | xi. Bottle gourd |
| | xii. Teasel gourd |
| | xiii. Garden pea |
| | xiv. Radish |
| | xv. Pointed gourd |
| | xvi. Indian spinach |
| | xvii. Ladis finger |
| | xviii. Yardlong bean |

Source: PRA, February 2012

Table 8. Varieties of the Major Crops Grown by the Farmers of Sadullahpur Village

| Crops | Varieties |
|---------------|---|
| T. Aus | BRRI dhan 26, BRRI dhan 28, Minikate, Kajol lata, GS, Hybrid, Laltia |
| T. Aman | Guti Sharna, BR 10, BRRI dhan 30, BRRI dhan 39, BINA dhan 7 |
| Boro | Minikate, Kajol lata, BR 26, BRRI dhan 28, BRRI dhan 29, Tej, Supper 8 |
| Jute | Bankim, Moharastra, Mohamaya, 09897, 04 |
| Mustard | Tori 7, BARI Sarisha 9, BARI Sarisha 11, BARI Sarisha 15, Rai (Punjab) BINA Sarisha 4 |
| Cucumber | Hybrid |
| Cabbage | Atlas 70, KK cross |
| Cauliflower | White plus |
| Knolkhol | Hybrid, early harvest, quick star |
| Tomato | BARI Tomato 3, BARI Tomato 7, Hybrid |
| Brinjal | Chagai, Hybrid, Singnath |
| Bitter gourd | Hybrid, Local |
| Chilli | Local, Hybrid |
| Sweet gourd | Local, Hybrid |
| Bottle gourd | Hybrid, Local |
| Teasel gourd | Local |
| Garden pea | BARI Motorsuti 2, BARI Motorsuti 3, Local |
| Radish | BARI Mula 2, Hybrid |
| Pointed gourd | Local |
| Lentil | BARI Musur 3, BARI Musur 4 |

| Crops | Varieties |
|----------------|--------------------------|
| Mung bean | BARI Mung 5, BARI Mung 6 |
| Indian spinach | Hybrid |
| Ladis finger | Hybrid |
| Yardlong bean | Hybrid |
| Sesame | Aat sira |

Source: PRA, February 2012

Rainfed and Irrigated Areas, Sources of Irrigation

The total irrigated area of the village is 70 percent of cultivable land and the remaining 30 percent is rain fed. The source of irrigation is Shallow Tube Wells (STW) and number of STW is 20.

Crop Damaged by Natural Calamity

Natural calamity is caused by hailstorms, cyclones, heavy floods and heavy rainfall.

Agri-Machinery Use

Most of the farmers use power tillers for cultivating their land. In addition to power tillers (two), rice threshers (five) are used. There are also power tillers from adjacent villages that are hired to plow the land.

Use of Fertilizer and Pesticide in Crops

Farmers use *Guti* urea, prilled urea, triple superphosphate (TSP), muriate of potash (MOP), gypsum, zinc sulfate and boric acid fertilizers and Furadam, Thiovit, Darsbarn, Ridomil gold, Tilth, Karate and Diathane M 45 pesticides. Use of fertilizer by crop is presented in **Annex IV**. The availability of *Guti* urea is not a problem because one briquette machine is running near the village and farmers can purchase *Guti* urea easily from the shop owner.

Seed Source

Seventy five percent of the farmers use their own seed. The rest (25 percent) get seeds from different organizations, namely the Bangladesh Agricultural Development Corporation and private seed companies (e.g., Syngenta Bangladesh, Namdary seeds, Lal Teer). Seed quality is a big issue in the village. In many cases, the germination rate as well as the vigor of the seedling is poor.

Land Use Pattern

The agro-ecological zone for the village is AEZ-11. The land types of the village are shown in **Table 9**. In high land, farmers cultivate vegetables, potato, chilli, mungbean, and T. Aman. In medium-high land, they cultivate Boro rice, T. Aman rice, T. Aus rice, some vegetables, mungbean, mustard and lentil. Farmers also cultivate T. Aman rice, T. Aus and Boro rice in medium-low land. The factors affecting crop production through the year in Sadullahpur village is shown in **Table 10**.

Table 9. Land Types of Sadullahpur Village

| Categories of Land | Percent |
|--------------------|---------|
| High land | 20 |
| Medium high land | 75 |
| Medium low land | 5 |
| Total | 100 |

Source: PRA February 2012

Timelines

Timelines related to agriculture production as defined by the PRA are shown in **Tables 10, 11 and 12**.

Table 10. Factors Affecting Crop Production through the Year in Sadullahpur Village

| Items | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec |
|----------------------|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|
| Rainfall | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| Time of irrigation | | ■ | ■ | ■ | ■ | | | | | | ■ | ■ |
| Credit supply | | ■ | ■ | ■ | | | | | | | ■ | ■ |
| Labor demand | | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | ■ | ■ |
| Price of crops (low) | | ■ | ■ | | | ■ | ■ | ■ | | ■ | ■ | |
| Temperature (high) | | | ■ | ■ | ■ | | | ■ | ■ | | | |
| Winter season | ■ | ■ | | | | | | | | | ■ | ■ |
| Demand of fertilizer | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | |

Source: PRA February 2012

Table 11. Historic Timeline of Major Crop Intervention in the Sadullahpur Village

| Crop Parameters | Year | Variety/Response |
|--|------|---|
| Using fertilizer since | 1967 | - |
| Growing mungbean since | 1970 | Local |
| Growing lentil since | 1970 | Local |
| Year of first Shallow Tube well installation | 1982 | - |
| Growing Boro/Aus HYV since | 1985 | China, Ratna |
| Year introducing nursery (sapling/seedling) | 1992 | |
| Using power tiller since | 2000 | - |
| Using IPM since | 2002 | |
| Growing vegetable (hybrid) since | 2005 | Hybrids |
| Growing HYV rice since | 2007 | BRRi dhan26, BRRi dhan28 |
| Growing HYV rice since | 2009 | GS, Hybrid, Laltia, BINA dhan7, BRRi dhan29, BRRi dhan30, BRRi dhan39 |
| First used UDP | 2012 | During Boro Season |

Source: PRA February 2012

Table 12. Timeline of significant agriculture changes at Sadullahpur Village

| Year | Event |
|-----------|--|
| 1971-1980 | Agriculture depends on rainfall. Two rice crops (Aman and Aus) and pulses (lentil, mungbean and grass pea) were cultivated. The major varieties of T. Aman were <i>Tapo</i> , <i>Masranga</i> , <i>Kochoi</i> , <i>Monohar</i> and <i>Goshta</i> and its yield was about 7-8 mounds/bigha (2.0-2.5 t/ha). Pulses were cultivated in high land and rice in medium-high land and medium-low land. Farmers used urea and cowdung for crop production. |
| 1981-1990 | In 1982, the shallow tube wells (STWs) were introduced and it created a revolution in agriculture bringing about diversification in crop cultivation. The variety of Boro rice viz. <i>China & Ratna</i> and the variety of T. Aman rice - BR 4, BR 10, BR 11 and Punjab having an encouraging yield of 15-20 mounds/bigha (4.5-5.0 t/ha). Plowing and fertilization were similar to the last decade. The cultivation of vegetables began namely lal shak, Indian spinach, cabbage, cauliflower, sweet gourd, brinjal and bottle gourd. Local varieties of jute, pulses, chilli crops were also cultivated. |
| 1991-2000 | The power tiller was introduced in this period. China and Ratna were cultivated as Boro varieties with an average yield of 15-20 mounds/bigha (4.5-5.0 t/ha). Lal shak, Indian spinach, cabbage, cauliflower and tomato were new crops cultivated in the area. |
| 2001-2011 | BRRi dhan 28 became a popular variety for Boro rice cultivation. Hybrid and HYV varieties were also introduced for Boro, T. Aman and T. Aus during this period. BRRi dhan 26, BRRi dhan 28, GS, Hybrid, Laltia, BINA dhan7, BRRi dhan29, BRRi dhan30, BRRi dhan39 and some hybrids were introduced in the village. Farmers adopted the cultivation of hybrid varieties of vegetables. Mungbean varieties of BARI mung-5 and BARI mung-6 were also introduced during this period. For mustard, BARI Sarisha-9, BARI Sarisha-11, BARI Sarisha-15, Rai (punjab), BINA Sarisha 4 was cultivated. The lentil varieties, BARI Musur 3 and BARI Musur 4 were cultivated in the locality. The existing crops and cropping patterns are shown in Table 7 . |

Source: PRA February 2012

Division of Labor in the Seasonal Calendar

The flow diagram in **Figure 3** indicates that the men are involved in almost all the activities in T. Aman rice production. Women tend to be more involved in post-harvest activities. Land preparation for rice production is exclusively a male activity.

Division of Labor in the Seasonal Calendar

| Month \ Activities | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar |
|---|-----|-----|-----|-----|-----|-----|--------|--------|-----|--------|-----|
| Land preparation for seedbed | | → M | | | | | | | | | |
| Seedbed sowing | | → M | | | | | | | | | |
| Seedbed management | | → M | | | | | | | | | |
| Land preparation for planting by power tiller | | | → M | | | | | | | | |
| Seedling uprooting | | | → M | | | | | | | | |
| Transplanting | | | → M | | | | | | | | |
| Intercultural operation | | | → M | | | | | | | | |
| Harvesting | | | | | | | → M | | | | |
| Carrying & Threshing | | | | | | | → M, F | | | | |
| Cleaning & drying | | | | | | | → F | | | | |
| Storing | | | | | | | | → E, M | | | |
| Marketing | | | | | | | | | | → M, F | |

M and F indicate male and female, respectively.

Source: PRA February 2012

Figure 3 Gender Participation for T. Aman Rice at Sadullahpur Village

The flow diagram in **Figure 4** for homestead gardening at Sadullahpur village indicates that women (with men) are involved in almost all activities of vegetable production including land preparation that is shared with the men.

| Month Activities | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Land preparation for seedbed (F 80%, M 20%) | | | | | | | | F,M | | → | | |
| Seed sowing on seedbed (F 90%, M 10%) | | | | | | | | F,M | | → | | |
| Seedling management (F 80%, M 20%) | | | | | | | | F,M | | → | | |
| Land preparation for planting, seedling uprooting and seedling planting (F 80%, M 20%) | | | | | | | | F,M | | | → | |
| Intercultural operation (fertilization, weeding, pesticide, etc.) (F 95%, M 5%) | | | | | | | | | F,M | | | → |
| Harvesting (F 100%) | → | → | | | | | | | | | F | → |
| Seed preservation (F 100%) | → | | | | | | | | | | | F |
| Grading and Storing (F 15%, M 80%) | → | → | | | | | | | | | F | → |
| Marketing (F 20%, M 80%) | → | → | → | | | | | | | | M,F | → |

M and F indicate male and female, respectively.

Source: PRA February 2012

Figure 4. Gender Participation for Homestead Gardening at Sadullahpur Village

Table 13: Time required for different activities in *T. aman* rice production at Sadullahpur

| Activities | Time required per/ha | | | Remarks |
|---|----------------------|--------------|--------------------|---------------|
| | Days (A) | Hour/day (B) | Total hrs/ha (AxB) | |
| Land preparation for Seed bed | 2 | 6 (1) | 12 | Man hr |
| Seed sown on Seed bed | 1 | 4 (1) | 4 | Man hr |
| Seed bed management | 6 | 4 (1) | 24 | Man hr |
| Land preparation (By power tiller) | 3 | 6 (1) | 18 | Man hr |
| Seedling uprooting | 1 | 8 (7) | 56 | Man hr |
| Transplanting | 2 | 8 (10) | 160 | Man hr |
| Intercultural operation weeding, fertilization, pesticides application etc. | 4 | 8 (4) | 128 | Man hr |
| Harvesting & carrying | 4 | 8 (9) | 288 | Man hr |
| Threshing (By power tiller) | 2 | 8 (2) | 32 | Man hr |
| Winnowing & drying | 4 | 8 (2) | 64 | Man hr |
| Storing | 1 | 8 (2) | 16 | Man hr |
| Marketing | 5 | 4 (2) | 40 | Man hr |
| TOTAL | | | 842 | Man hr |

Note: Figures within parentheses indicate number of person

Source: PRA February 2012

For one hectare T. Aman cultivation required 842 man hours including hired and own labor. Labor wages vary month to month specially during the transplanting and harvesting time of rice. Daily labor wages range from Tk. 250 to Tk. 300.

Production Systems

The farmers of Sadullahpur village produce different crops and different fruits such as mango, guava, litchi, jujube, papaya, etc. Generally, family labor is used but farmers have to purchase fertilizer and insecticides from the local market – Indra and Bagherpara bazar. Sometimes they buy seeds from other local markets and from neighbors. Irrigation is one of the most important inputs for crops and fruit production. Under ground water is used for irrigation when necessary. Both men and women are involved in production. Men are mainly involved in field activities and harvesting for crops, but post-harvest work is mainly done by women. Most of the farmers sell their products in the Indra, Bagherpara and Khajora bazaar.

Cost of Production of Boro Rice at Sadullahpur Village

Boro – Fallow - T. Aman is one of the main cropping patterns in Sadullahpur village. **Table 14** provides an analysis of costs and returns for the Boro rice production. Cost is calculated for human labor, power tiller, power thresher, seed, fertilizer, pesticides, etc. It was found that the total costs of cultivation, gross return and net return of Boro rice are Tk. 46,425/ha, Tk. 76,720/ha and Tk. 30,295/ha, respectively. Cost of per kg paddy is Tk. 8.44. The table also reveals that return per taka invested was 1.65, which means if a farmer invests one taka for Boro rice production, then he/she will receive Tk. 1.65 in return.

Table 14 Cost and Return (Tk) per Hectare for Boro Rice at the Village of Sadullahpur under Bagerpara Upazila

| Cost Item | Units | Quantity | Price Tk/unit | Total Value (Tk) |
|---|-------|----------|-----------------------------------|------------------|
| Human labor (m-d) | | | | |
| Land preparation (by power tiller) | Md/ha | 3 | 1,250 (including power tiller) | 3,750 |
| Land preparation for seedbed, seed sown on seedbed and uprooting of seedlings | | 12 | 250 | 3,000 |
| Planting | | 20 | 250 | 5,000 |
| Weeding | | 13 | 250 | 3,250 |
| Fertilizer application | | 3 | 250 | 750 |
| Harvesting and carrying | | 35 | 250 | 8,750 |
| Threshing (by power thresher) | | - | - | 2,000 |
| Seed | kg/ha | 25 | 40 (per kg) | 1,000 |
| Fertilizer | | - | - | 8,425 |
| Pesticides | | - | - | 1,500 |
| Irrigation | | | | 9,000 |
| Total cost (Taka/ha) | | | | 46,425 |
| Grain yield | kg/ha | 5,500 | 13 (per kg) | 71,500 |
| Straw yield | kg/ha | 5220 | 1 (per kg) | 5,220 |
| Gross return | Tk/ha | | | 76,720 |
| Net return per hectare | | | | 30,295 |
| Return per Taka invested | | | | 1.65 |

Source: PRA February 2012

Input Output Sharing Systems of Major Crops between Owners and Tenants

Tenant land is mainly used for rice crops. In most of the cases the land owner does not share input cost and in that case, the land owner gets 33 percent of production and 66 percent goes to the tenant. In some cases for the Boro crop, the land owner shares 50 percent of the inputs and the product is shared 50-50 (Table 15). Absentee landowners prefer lease instead of tenant agreements. A one-hectare lease is Tk. 32,000 to 36,000 per year.

Table 15: Input Output Sharing Systems of Major Crops between Owner and Tenants

| Crops | Input share (%) | | Output share (%) | |
|---------|-----------------|--------|------------------|--------|
| | Owner | Tenant | Owner | Tenant |
| T. Aus | 0 | 100 | 33 | 66 |
| T. Aman | 0 | 100 | 33 | 66 |
| Boro | 0 | 100 | 33 | 66 |
| Boro | 50 | 50 | 50 | 50 |

Source: PRA February 2012

Soil Grade Mapping Exercise

Methodology

- A sketch of the village was drawn by asking for information about the features of the village.
- The location of roads, important places and different fields (via farmer information-sharing) and were marked with different colors and symbols.
- Based on farmers' experiences with land topography, soil texture, fertility gradient and crop production, participants identified three different categories and divided the entire cropping area into three classes of fertility, with the soil with the highest fertility classified as "I" and then as "II" and "III." The farmers' indigenous technical knowledge of soil fertility may be checked, compared and validated through soil testing.
- Fertile soil was marked on the map as "grade I," medium fertile soil was marked "grade II" and less fertile soil was marked "grade III."

Table 16 provides information on characteristics of different soils fertility grades.

Table 16. Characteristic of Different Soil Fertility Grades

| Grade | Area Cover (%) | Land Type | Soil Texture | Major crop |
|-----------|----------------|-------------|--------------------|---|
| Grade I | 30 | Medium-high | Loam to clay loam | Aman, Boro, Date palms, Vegetables, Lentil, Mustard |
| Grade II | 25 | Medium-low | Sandy loam to loam | Boro, Aus, Aman, Vegetables, Mustard |
| Grade III | 45 | High | Sandy to loam | Vegetables, Seed bed, Bamboo bushes, Fruit trees, Date palms, Vegetables, T. Aman |

Source: PRA February 2012

Farmers' Diagnostic Tools for Soil Fertility Evaluation

An evaluation of farmers' indigenous technical knowledge of soil fertility was assessed through the PRA approach. The main tool for the farmers to categorize soil fertility was the crop yield. The assumption is that fertile land produces a better yield with less fertilizer. On the other hand, farmers used higher doses of fertilizer in case of low fertile soil. The PRA shows that the farmers are familiar enough with soil characteristics to differentiate a fertile soil from an infertile soil.

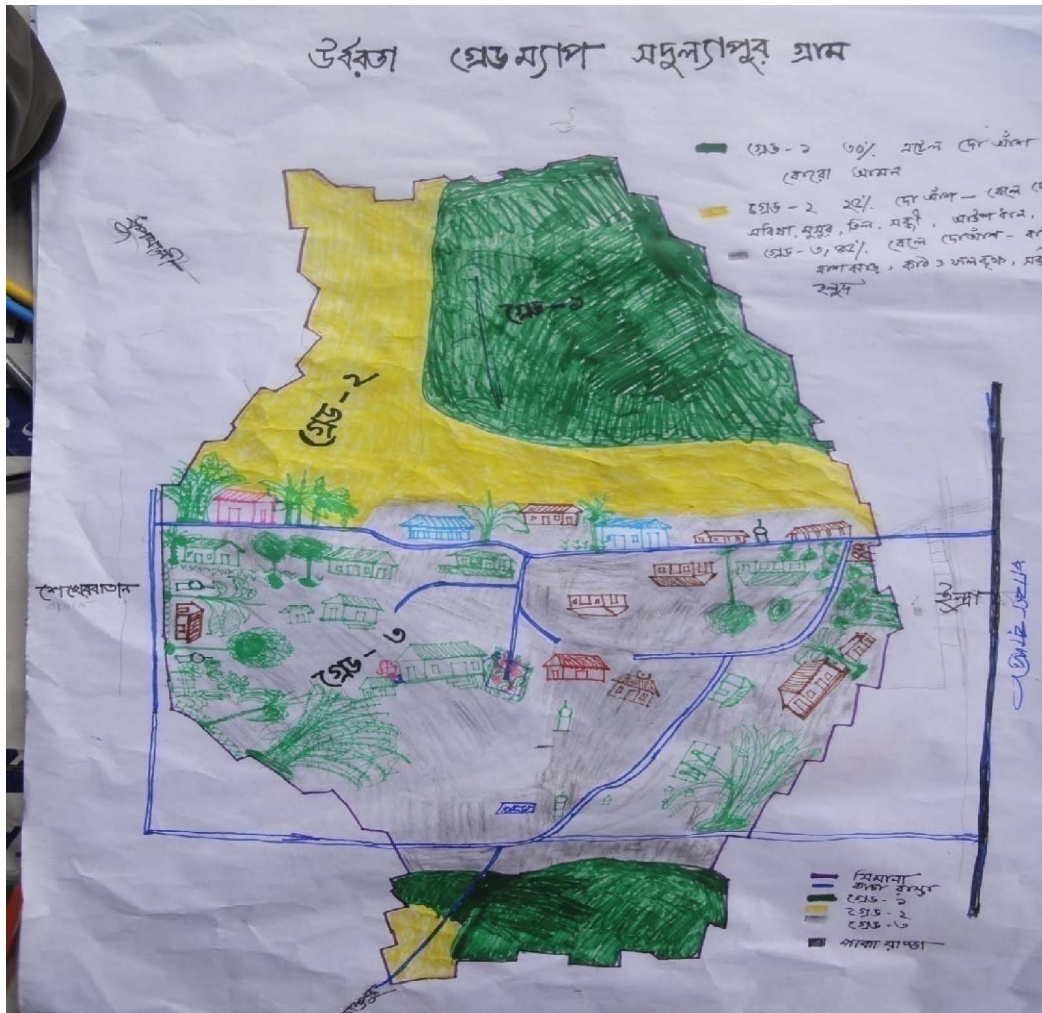
Use of Soil Fertility Map

Farmers' experiences in soil fertility variations within a village have great value in crop and soil research. Site-specific management zones have the potential to be an effective

alternative to grid soil sampling for quantifying and managing spatial variability for fertilizer recommendations. Differential nutrient management by the owners and micro-topography fertility differences between plots make it difficult to prescribe a uniform rate of fertilizer for a wide area without consulting with the farmers. Therefore, farmers' experiences were utilized to prepare village-level soil fertility maps as an aid to decide site-specific nutrient management in the village (

Drawn by the PRA team members

Figure 5).



Drawn by the PRA team members

Figure 5: Soil Fertility Grade Map of Sadullahpur Village

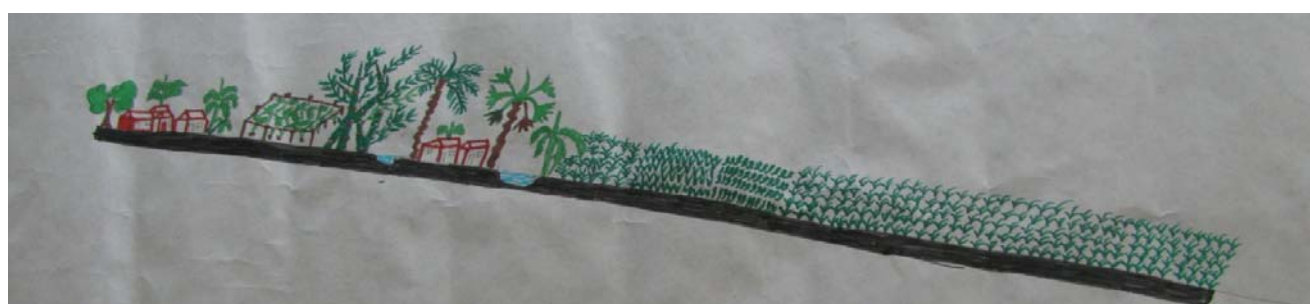
Village Transect

The transects provided scope to characterize the agro-ecological zones in terms of agricultural crops, fruits, fisheries, livestock rearing and other related constraints. They helped define the opportunities and variation within the village or between two areas within the village.

Figure 6 superimposes the transect on a table containing detailed information about land topography, soil type, land use, cropping pattern, existing facilities and constraints and development needs.



Transect drawn by PRA participants



| Characteristic | High land | Medium high land | Medium low land |
|---|---|--|---|
| Soil | Sandy loam | Silt loam | Clay loam, clay |
| Flood water receding time | Not applicable | Not applicable | Early to normal |
| Susceptibility of flooding by tidal water | Not applicable | Not applicable | Few inches flooding started from the last week of June-July |
| Land use | Vegetables, tomato, brinjal, potato, sweet gourd, chili, T. aman, okra, bottle gourd, country bean, jute, mustard, lentil | Boro, T. aus, T. aman, vegetables, mungbean, mustard, chili, lentil, jute, tomato, brinjal | T. aman, T. aus, Boro, mustard |
| Fruit tree | mango, litchi, guava, jackfruit, date palm, jujube, papaya, banana | Jujube, date palm | No trees |
| Timber trees | Rain tree, koroi, mehagoni, shisu, bamboo bushes, date palm | Date palm | No trees |
| Livestock | Cattle, goat, poultry, duck, pigeon | Cattle, goat, poultry, duck | - |
| Fish | Ruhi, tilapia, katla, thai sarputi, koi, cat fish | Ruhi, tilapia, katla, thai sarputi, koi, cat fish | koi, cat fish |

Source: PRA February 2012

Figure 6: Transect Walk Map of Sadullahpur Village

Economic Profile

The various sources of income generation of farmers are shown in **Annex III**. Classifications of sources of income are shown in **Figure 7** and **Annex II**.

The farmers of the village stated that they earn yearly income mainly from paddy. They estimated that Tk. 60 is earned from one decimal of timber and fruit trees per year. In Sadullahpur village, there were 355 cattle and 146 goats which is another source of income. The major source of organic manure is cow dung and sometime they use it as fuel. Ginger and turmeric may be grown in the shady places in the village.

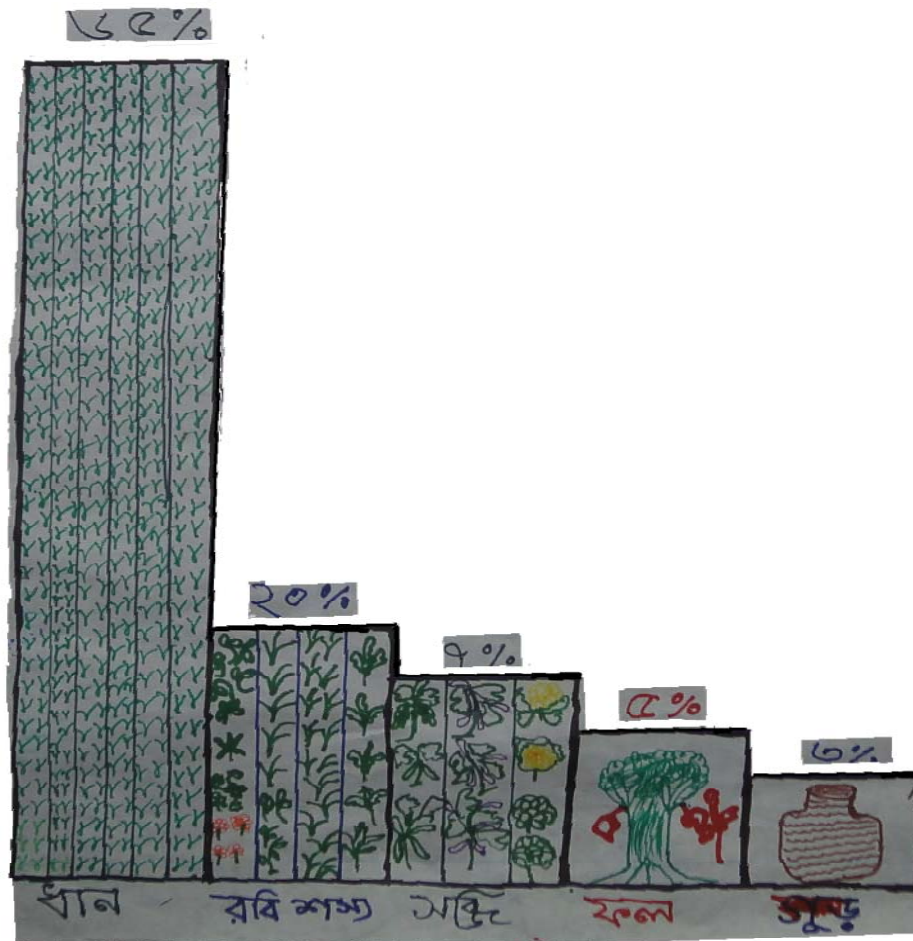


Figure 7. FKA Participants Classified Their Income from Own Resources

The main sources of earning of the farmers in the village are cereal crops, pulses, potato, date palms, vegetables, molasses (*gur*), fish and fruits. This is quantified in **Table 17** and **Table 18**. The landless farmers are earning, on average, Tk. 2,863 per month, largely from paid employment. However, they have little or no farm production. The marginal

farmers are earning, on average Tk. 2,890 per month, largely from their own cultivable land and sale agri. labor. The small farmers are earning, on average Tk. 3,895 per month, their earnings from agricultural production, sale of mustard, lentil, fruits and juice (date palm). The medium scale farmers are earning on average Tk. 5,625 per month. The marginal and small farmers supplement their income with farm products for home consumption. There is no large farmer in the village.

Table 17. Major Sources of Income of Farming Categories in Sadullahpur Village

| Category of Farmers | Total Households | Total Family Members | Male | Female | Av. HH Area (Decimal) | Av. Cultivated Land Owned (Decimal) | Total Share-cropped Land (Decimal) | Av. Area of Timber/Fruit (Decimal) | Total Cattle (All HH) | Total Pond (All HH) | Av. Monthly Income per HH (Tk.) |
|---------------------|------------------|----------------------|------|--------|-----------------------|-------------------------------------|------------------------------------|------------------------------------|-----------------------|---------------------|---------------------------------|
| Landless | 30 | 128 | 63 | 65 | 6.60 | 0 | 0 | 0.17 | 36 | 4 | 2863 |
| Marginal farmers | 25 | 104 | 54 | 50 | 7.76 | 22.80 | 0 | 1.60 | 63 | 9 | 2890 |
| Small farmers | 84 | 453 | 234 | 219 | 12 | 108.79 | 160 | 6.32 | 327 | 55 | 3895 |
| Medium farmers | 16 | 113 | 60 | 53 | 18 | 330.94 | 0 | 29.06 | 75 | 16 | 5625 |
| Large farmers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 155 | 798 | 411 | 387 | 11.72 | 96.79 | 160 | 6.72 | 501 | 84 | 3712 |

Source: PRA February 2012

Table 18. Average Statement of Farmers' Cultivable Land, Homestead Area, Forest Land, Ponds, Cattle and Monthly Income for Sadullahpur Village

| Average Cultivated Land (Decimal) | | Average Household Area (Decimal) | |
|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| Type of Farmer | Average Cultivated Land (decimal) | Type of Farmer | Average Household Area (decimal) |
| Landless | 0 | Landless | 6.60 |
| Marginal | 22.80 | Marginal | 7.76 |
| Small | 94 | Small | 12 |
| Medium | 344 | Medium | 18 |
| Large | 0 | Large | 0 |

| Average Total Pond | | Average Area of Timber and Fruits | |
|--------------------|--------------|-----------------------------------|--|
| Type of Farmer | Average Pond | Type of Farmer | Average Homestead plantation (decimal) |
| Landless | 0.13 | Landless | .17 |
| Marginal | 0.36 | Marginal | 1.60 |
| Small | 0.65 | Small | 6.32 |
| Medium | 1.00 | Medium | 29.06 |
| Large | 0 | Large | |

| Average Monthly Income | |
|------------------------|------------------------|
| Type of Farmer | Average Monthly Income |
| Landless | 2,863 |
| Marginal | 2,890 |
| Small | 3,895 |
| Medium | 5,625 |
| Large | 0 |

| Average Total Cattle | |
|----------------------|----------------------|
| Type of Farmer | Average Total Cattle |
| Landless | 1.20 |
| Marginal | 2.52 |
| Small | 3.89 |
| Medium | 4.69 |
| Large | 0 |

Source: PRA February 2012

Social Aspects

Power Structure

The power structure in the village is no different from any other village of Bangladesh. The focus of such structure can be categorized into (a) membership in local government bodies and (b) relatively affluent families who are generally medium farmers. There are no representatives of local government bodies either male or female. Women have access in community activities (Community salish, marriage ceremony, national days celebration, mitigation of local conflict). Some of the women farmers are involved in carrying and threshing of rice. Women are more involved in post harvest activities. Men are decision makers to grow vegetables in the crop field, but in the homestead garden women are the main decision makers to grow vegetable and fruits. It has been observed that out of 155 farm households, 10.32 percent are medium. There are no large farm families in the village.

Health

The government health facilities center on the upazila health complex. In the village, there is no community clinic. The villagers get services from the upazila hospital as well as the district hospital but the services are insufficient. The villagers mostly depend on a village doctor¹, *quack* and other sources of indigenous treatment. In serious cases the villagers go to the private doctors in the district head quarter but it is very expensive.

Nutrition

The existing food in-take pattern by different categories of farmers (rich, medium and poor) as described in Table 19 shows it needs some improvement. The poor and medium farmers should reduced intake of rice and increase fruit, vegetable and protein.

¹ The village doctor is not a qualified doctor but has received some basic medical training.

Table 19: Food Consumption Pattern by Different Categories of Farmers

| Food item | Daily intake gm/person | | | Remarks |
|-----------|------------------------|--------|------|--|
| | Rich | Medium | poor | |
| Rice | 650 | 750 | 900 | Poor farmers consume more carbohydrate and less protein. |
| Fish | 125 | 30 | 35 | |
| Meat | 60 | 25 | 10 | |
| Oil | 40 ml | 20 ml | 15 | |
| Egg | ¼ | ½ | - | |
| Vegetable | 350 | 300 | 250 | |
| Fruit | 60 | 30 | 25 | |

Source: PRA February 2012

Sanitation

Fifty five percent of the villagers use sanitary latrines (5% pucca and 50% ring and slab) and the remaining 45 percent use katcha or open latrines. The villagers use tube well water for drinking, cooking and washing purposes but some time they use pond water for washing. 70 percent of the tube wells are bearing arsenic. Villagers know about the adverse effects of arsenic but they have no alternatives.

Education

The villagers are giving priority to education for their children. The literacy rate is 70 percent, (among the 70 percent, 60 percent have passed primary education). It is relevant to mention that the national average is 45.32 percent according to the Population Census of 2001. In the village, female and male education ratio is 55:45. Up to HSC level, the number of educated females is higher compared to males. For the remaining 2% with Degree and above, males are dominating.

Services and Opportunities

Venn diagrams of services and facilities, including sources for all sectors, are shown in **Figure 8 - Figure 10**.

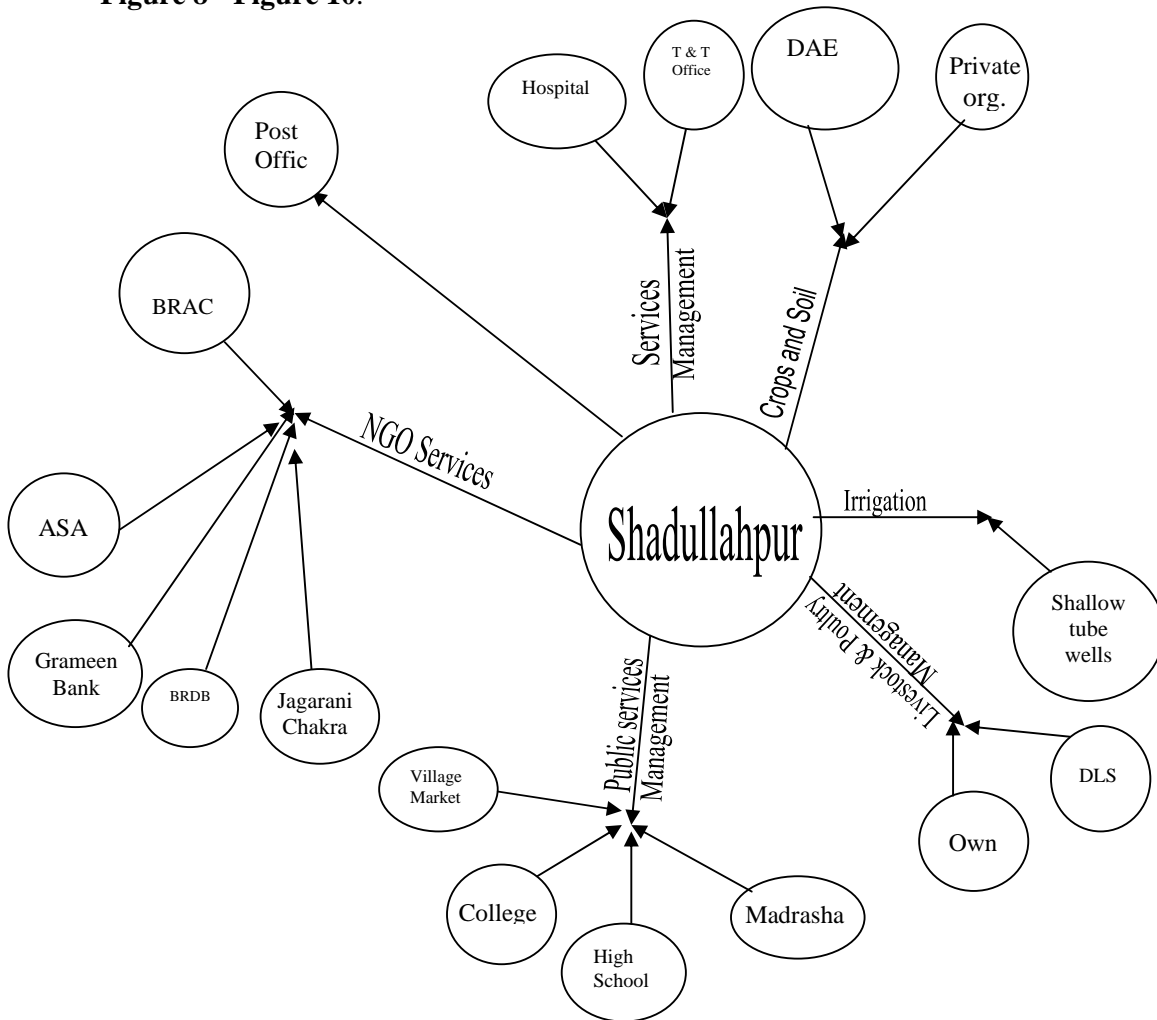


Figure 8. Venn Diagram Showing Overall Agricultural Extension Services

Venn diagram drawn by the PRA team members

Educational and Health Services

The overall picture is not very different from other villages in the country. There are no schools in this village. There is a school adjacent to the village and the village children attend this school. In case of health facilities, villagers depend on upazila headquarter. But there are inadequate services for health in the upazila.

DAE

T. Aus

T. Aman

Other Cron

IPM

Cultural Management

Note: DAE Department of Agriculture Extension.

Figure 9. The Venn Diagram for Crop Sector

The government extension service has a predominating role on agricultural extension services (technology dissemination and motivation). There are many NGOs working in the village but they only provide credit support for small business and crop production. Sixty percent of the small farm families get loan facilities from NGOs before starting the crop season. The NGOs start to collect the repayment of loan money after one week without waiting until crop harvesting. The villagers repay loan money by selling their labor, fruits, poultry and cattle. Due to inadequate training and technical support, farmers are unable to make proper plans to start small businesses and to maximize production from agriculture. There is no deep tube well and canal for irrigation and the villagers depend on shallow tube wells (STWs) for irrigation. There are no Bangladesh Chemical Industries Corporation (BCIC) fertilizer dealers or sub dealers in this village.



Venn Diagram drawn by PRA participants

Livestock Extension Services

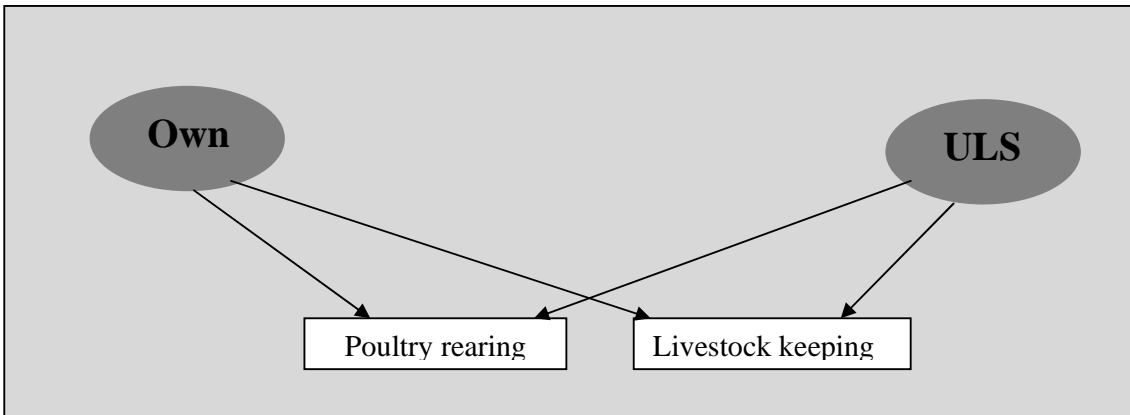


Figure 10. Venn Diagram Showing Livestock Extension Services of Sadullahpur

There are extension services on poultry rearing and livestock but it is inadequate. The livestock husbandry generally follows traditional practice.

Focus Group Discussion (FGD)

The focus group discussion was conducted separately by men and women groups including PRA team members, progressive farmers of the village, community leaders, IPM club members. Forty participants (male 25 and female 15) were present in the focus group discussions. Findings of attitudes and perceptions of the men and women were elucidated by the participants in the focus group discussion. In case of agriculture, modern technologies on crop production, training as well as availability of quality inputs (especially seeds) were all given high priority for development by the participants.

Agriculture is seen by the people as the driver of village improvement. Moving beyond subsistence toward commercial farming/agriculture is seen as opening opportunities for a better livelihood. Lack of infrastructure, knowledge, market chain and services, all are seen as constraints to commercial agriculture. These are seen beyond the reach of the people and requiring external support.

The PRA team documented the perceptions of the farmers about how they can influence the development of agriculture in their village.

Perception

| Resources/Items | Men's perception | Women's perception | Remarks |
|---|---|--|---|
| Homestead, fruit & timber trees, crops & livestock and ponds | Men did have an inherent knowledge of soil fertility, terrain and crop suitability but before the PRA they did not have a holistic view of the village. The mapping exercises and discussions helped illuminate the relationship between land type and the crops they grow. | Like the men, the women did not have a sense of whole village land use. Like the men the women came to realize the relationships between crops and locations and land types. | <i>PRA participants have drawn the transect diagram and identified the different components located in the village based on land types.</i> |
| Crops and cropping patterns | The men had their experience of crops and cropping patterns under rainfed and irrigated conditions, planting time and harvest. | Women were less concerned about cropping patterns, perhaps knowing the men were responsible. They had a good understanding of their roles and post harvest responsibilities for all crops. | <i>It would help them to plant at the optimum time to maximize crop yields.</i> |
| Major varieties of different crops | The long duration of T. Aman varieties means they can't plant vegetables as well as mustard at optimum time. They think that they are not getting optimum yield due to lack of proper management. They are not able to identify the appropriate varieties of vegetables to match planting time. | Women have less idea on major varieties of different crops to match planting time. | <i>It would help them to select appropriate variety based on land types.</i> |
| Introduction of modern technologies | They know that if they use modern technologies they will get higher yields but they also think it will cost more. | | <i>Need some explanation on cost and returns from modern technologies.</i> |
| Fertility level of different land | From their experiences they know the fertility status of different fields and accordingly they select crop and fertilizer doses. | Women have some idea about fertility status of different field | <i>People drew a soil fertility grade map of the village</i> |
| Participation of male and female in different activities of crop production | Men think that heavy work as well as work in the field will be performed by male. | Women think that they are able to do light work as well as the work adjacent to the homestead. | <i>In PRA the participants quantified the time spent in each activity by gender participation</i> |
| Increase in yield | The participants know they follow traditional techniques for rice cultivation and this is responsible for low yields at | | <i>There is a strong interest in modern technology. They see this as a means</i> |

| | | |
|-----------------------|---|---|
| | <p>about 5 mt/ha in comparison to the potential yield of 7-8 mt/ha for HYV varieties. The same is the case for potato; they are harvesting 12.5 mt/ha against a potential yield of 25-30 mt/ha. The participants recognized and defined the causes of low yield as:</p> <ul style="list-style-type: none"> • Not using modern technologies properly. • Not knowing the appropriate crop/variety to match soil fertility and land type. • Not using balanced fertilizer doses for crop production. • Not considering age of seedlings for rice transplantation as well as vegetables. • Not using organic manure as per crop requirement. • Not being able to establish the crop in the optimum time (especially rabi crops). Most of the rabi crops are delayed due to the cultivation of long duration varieties of rice in Aman. • Not providing supplemental irrigation on time in T. Aman. • Not adequate knowledge on insect and disease management in vegetables. | <p><i>to increase yields to provide food security; from the additional yield, they can sell rice and vegetables to meet expenses for children's schooling, purchase assets for the household, access medical treatments, build new houses and maintain nutrition, all working toward a better livelihood.</i></p> |
| Better quality inputs | <p>Both men and women believe they do not get a reasonable return on the money invested on inputs because of the lack of quality and knowledge. Seed, fertilizer and water management are all described as "traditional." This seems to imply that the practices are derived from local experiences. The farmers use their best grain as seed. Germination is low. Some seed is bought from the local market but is described as poorer quality. Fertilizer is applied by experience with the exception of Guti urea, which is applied on about 35 ha of rice and 1 ha of vegetables. Water is not well managed and is applied at the discretion of the pump manager.</p> | <p><i>There is a strong interest in modern technology to produce best quality seeds, management of low-cost irrigation systems, better pesticide and insecticide management and balanced fertilizer application, in which farmers can reduce their input cost, save money and increase yields. Farmers believe if they know how to manage soil health by using balanced doses of fertilizer and by using fertilizer within a cropping pattern, they can improve the yield and quality of their products</i></p> |
| Marketing | <p>Within the village there is no weekly market but adjacent to the village there is a market but no good market chain facilities for selling their products. They fully depend on middlemen and they become price takers for their products such as rice, vegetables, fruits, bamboo, guava, timber, etc.</p> | <p><i>The farmers of the village are very interested in learning how to link with markets. They are particularly interested in knowing how they can get actual market prices for their products. If they can earn more, they can produce more, grow more high-value crops, earn more money and raise their living standards.</i></p> |

| | | | |
|--|---|--|---|
| Purchase of agricultural equipments and assets | Men believe they are more knowledgeable than women. Management of land, agriculture equipment, agricultural product transportation is controlled by the men because they are the main earning members of the family. Sometimes men share ideas with their wives to manage the land, purchase agricultural equipments. | Women accept men are mainly involved in crop production. In some cases women do make a contribution to crop production especially in homestead garden crops. | |
| Decision making to purchase food items for family consumption, education and medication. | As an earning member, men have the control over purchase of food, health care and education for the family. Men believe they need quick treatment from qualified doctors and they should be healthy and energetic as the income earner as well as to provide family maintenance and movement. | Women prepare the food lists considering nutritional value and choice of others family members. Women accept men will select the schools and college based on financial ability but they are responsible for the day to day education of the child. Women accept their medical treatment from village doctors with low cost. | |
| Access to markets | Men believe they have experience and access to markets and know the facilities of marketing. Men believe that women lack knowledge on marketing and have no bargaining capacity to make a profit from marketing. | The social environment does not allow women access to market or marketing. Women believe that they have a contribution in marketing. They are involved in grading and sorting produce for a better price. | <i>While men believe they have the experience, the PRA team found they lacked any access to market information.</i> |
| Overall perception | | | |
| Access and control over resources and decision making. | Ownership of the land, selection of variety, sale of products, inputs use for production, harvesting of crop is all dominated by the men because they are the family head and land owners. There is a gradual change in the men thinking women need to be involved in all the agricultural | Women have no ownership of land. Relating to access and control over resources, social barriers and constraints prevail in agriculture. Products, input use, food habits, health, access to education, market, future training needs, awareness etc men are playing a dominating role. | |

| | | | |
|--|---|---|--|
| | <p>activities and in the decision making process. Food consumption for the family members needs to be decided by the women.</p> | <p>The overall perception of women is that men are the income earning members of family. So they have full authority to control everything. In all aspects, men are sharing with women members but men take the final decisions. On the other hand, women play the vital role in post harvest activities. They are also involved in homestead vegetable production. Women have limited knowledge on commercial seed and vegetable production.</p> | |
|--|---|---|--|

Recommendations

1. For short duration of T. Aman rice variety, BINA Dhan-7 may be introduced to allow early establishment of winter vegetable crops such as cauliflower, cabbage, tomato, brinjal, etc. In that case, *Guti* urea should be used instead of prilled urea for higher N use efficiency and higher production.
2. Input supply, quality and quantity are critical for agriculture development in the village. By taking a whole-village approach to seed, fertilizer, chemicals and water management, there will be opportunities for entrepreneurs to engage in seed production, balanced fertilizer supply and judicious use of pesticides. There is an IPM club in the village where women are active members of the club. The Integrated Pest Management (IPM) club should be strengthened regarding quality seed production, balanced fertilizer use and judicious use of pesticides. Training should be provided on leadership, water management, marketing, skill and technology for crop production.
3. High-value vegetable crops such as cabbage, cauliflower, brinjal and tomato should be cultivated in the homestead using *Guti* urea for higher productivity. Banana, Teasel gourd, Bottle gourd and country bean may be expanded as field crops using *Guti* urea.
4. The village needs to establish links to commercial markets where they can receive price information. Such information combined with group marketing would enhance their bargaining power when selling produce.

5. By using soil fertility grade maps, three site-specific fertilizer doses may be recommended for individual crops and cropping patterns for sustainable soil health.
6. Training is critical to meet the demand for skills and knowledge on modern farming technologies. There is a penchant for learning in the village and this need to be satisfied by extension services.
7. Soft loan facilities are needed for agricultural production; this should be coupled with training on farming as a business to enable those wishing to invest in modern technologies to have access to the resources and the capacity to make a return on that investment.

Table 20 provides an AAPI work plan for activities that will respond to the recommendations.

Farmer training will follow normal AAPI guidelines to promote FDP technology, good seed and alternate wetting and drying (AWD). In this instance, the objective is to get 100 percent coverage of the rice crop under FDP in all seasons within two years. Therefore, the intensity of the training is higher than normal.

Demonstrations will entail all the AAPI technologies in rice and vegetables as well as provide demonstrations of improved cropping systems:

Cropping pattern demonstration using *Guti* urea:

- | | | | |
|----|---------|---------|-----------------------|
| 1. | Cabbage | T. Aus | T. Aman (BINA dhan-7) |
| 2. | Tomato | T. Aus | T. Aman (BINA dhan-7) |
| 3. | Brinjal | T. Aus | T. Aman (BINA dhan-7) |
| 4. | Boro | T. Aman | |

Beside the above cropping pattern, Banana demonstrations using *Guti* urea will be carried out.

Homestead vegetables using *Guti* urea:

1. Cabbage, Cauliflower, Tomato, Brinjal

Selected demonstration farmers for training on cropping pattern demonstration using *Guti* urea – six batches

Selected demonstration farmers for training on homestead vegetables using *Guti* urea – two batches

This is an intensive program. To facilitate the communication between the village and AAPI and to maintain a close monitoring of the demonstrations, it is recommend that AAPI assign one female and one male **village activity monitor** within the village who has credibility and some education, and who can serve to keep AAPI informed of performance and issues arising as well as maintain any records required.

Table 20. Activity Workplan for AAPI in Response to the PRA Recommendations

| Activity | Units | Total Number of Units | Year 1 (2011-2012) | | | | Year 2 (2012-2013) | | | |
|--|---------|-----------------------|--------------------------|------------------------|-----------------------------|-----------------------------|-----------------------------|-------------|-----------------------------|-----------------------------|
| | | | April - June | July - Sept | Oct - Dec | Jan - March | April - June | July - Sept | Oct - Dec | Jan - March |
| Selected farmer training on cropping pattern demos using <i>Guti</i> | batches | 6 | 1 | 1 | 1 | | 1 | 1 | 1 | |
| Selected training on homestead vegetables using <i>Guti</i> urea | batches | 4 | 1 | 1 | | | 1 | 1 | | |
| Cropping pattern demos | number | 4* | 2 **Patterns 1 & 2 | 2 Patterns 1 & 2 | 4 Patterns 1, 2, 3, 4 | 4 Patterns 1, 2, 3, 4 | 4 Patterns 1, 2, 3, 4 | | 4 Patterns 1, 2, 3, 4 | 4 Patterns 1, 2, 3, 4 |
| Selected training on Banana demos using <i>Guti</i> urea | batches | 2 | | | 1 | | | | 1 | |
| Homestead vegetables using <i>Guti</i> urea demos | number | 7 | 1 | | 2 | | 2 | | 2 | |
| AWD demo (Boro) | number | 1 | | 1 | | | | | | |
| Field days | number | 6 | | 1 | 1 | 1 | 1 | | 1 | 1 |
| Crop cuts | | 27 | | 6 | 4 | | 4 | 5 | 4 | 4 |
| Motivational field visit | number | 1 | | 1 | | | | | | |
| Motivational meeting | number | 2 | | | | 1 | | 1 | | |

* Each demonstration of cropping pattern with three crops

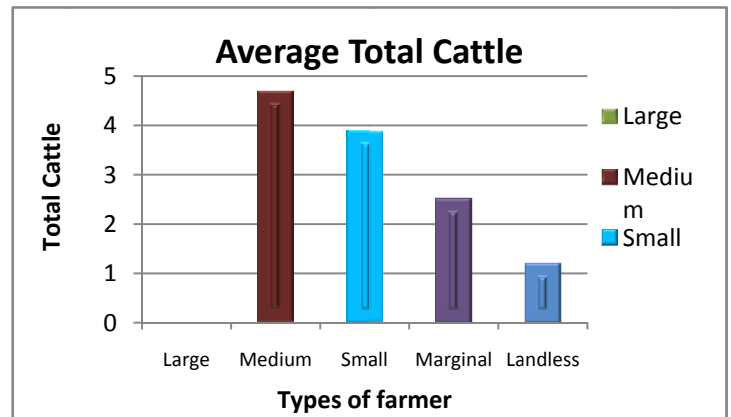
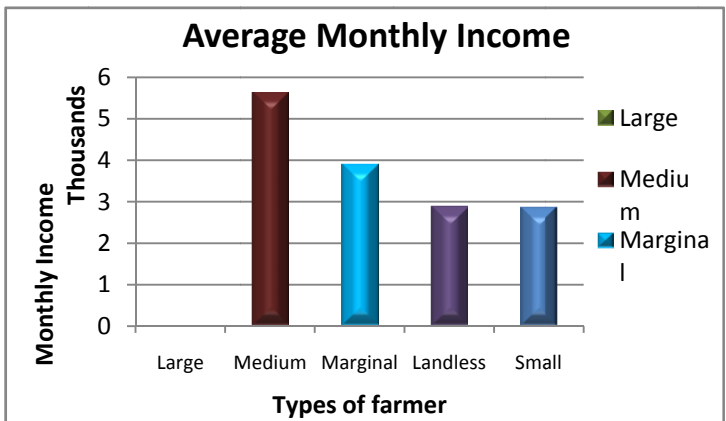
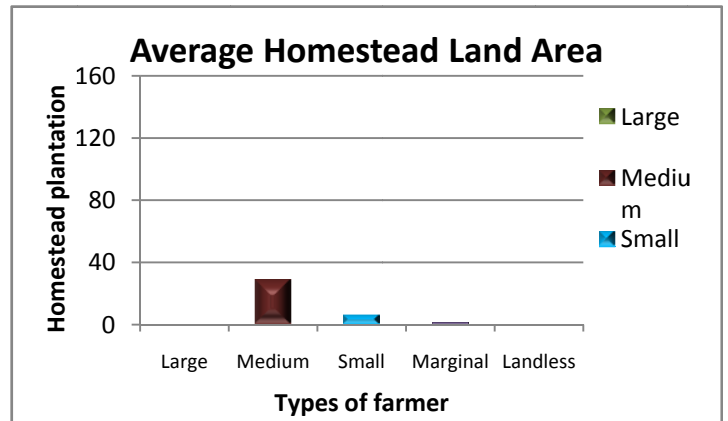
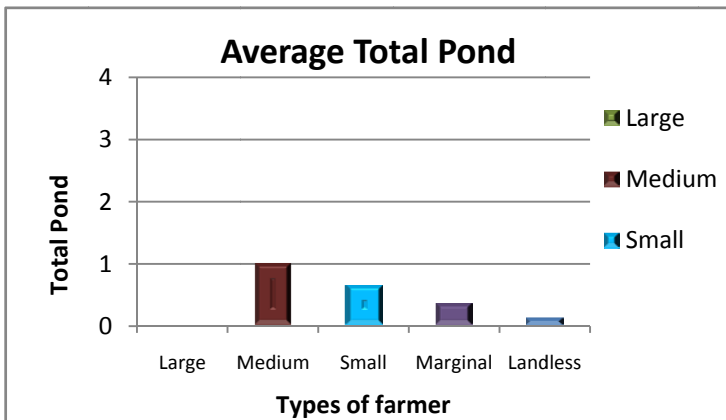
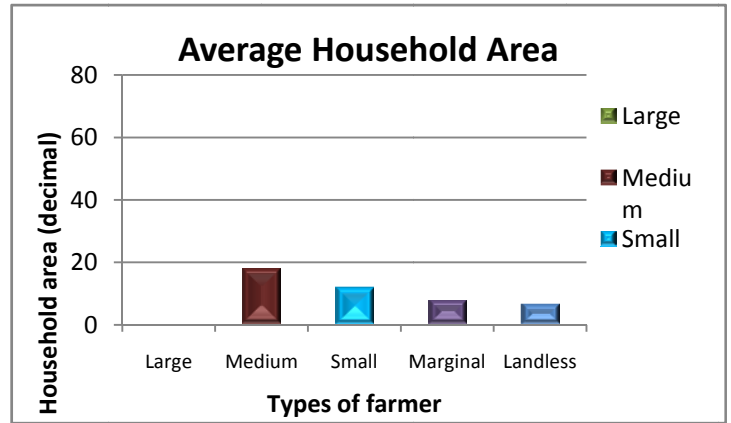
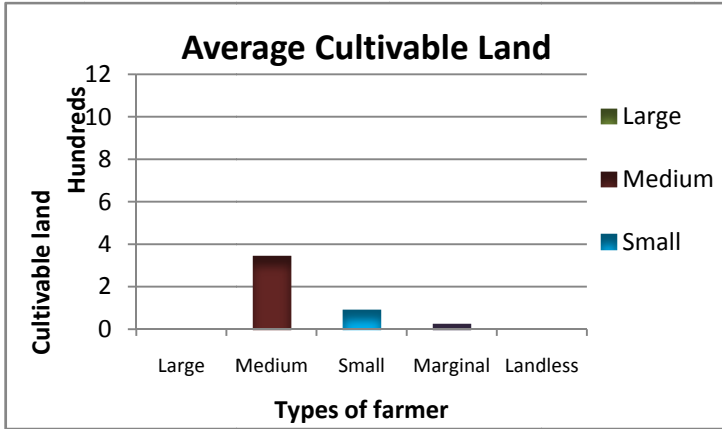
**Cropping Patterns

- | | | | |
|----|---------|---------|-----------------------|
| 1. | Cabbage | T. Aus | T. Aman (BINA dhan-7) |
| 2. | Tomato | T. Aus | T. Aman (BINA dhan-7) |
| 3. | Brinjal | T. Aus | T. Aman (BINA dhan-7) |
| 4. | Boro | T. Aman | |

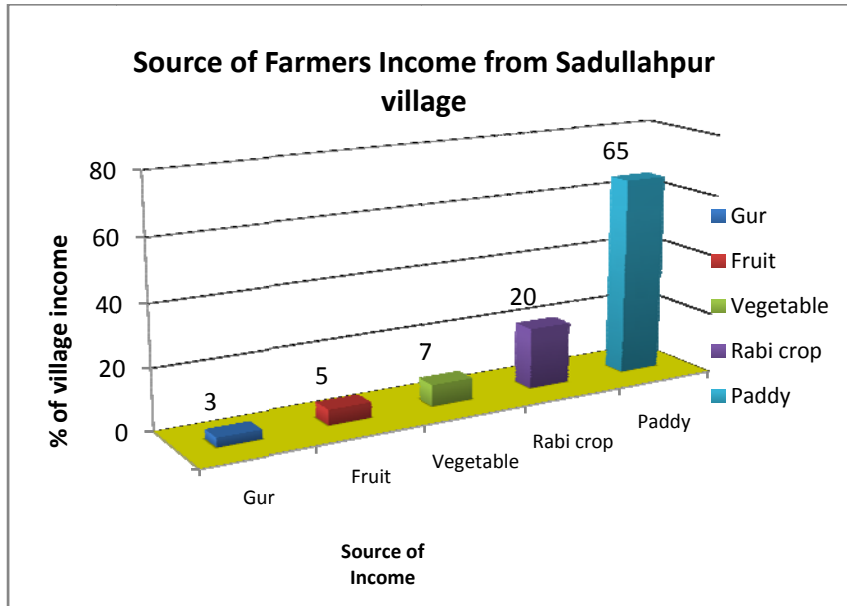
Annex I : List of Participants in the PRA Activities

1. Ms. Hasina Begum
2. Ms. Parvin Begum
3. Md. Hayder Ali
4. Md. Fasiar Biswas
5. Ms. Selina Begum
6. Ms.Nasima Begum
7. Dr. Hafizur Rahman
8. Ms. Asia Khatun
9. Ms. Arifa Sultana
10. Md. Kayem Ali Biswas
11. Md. Solayman Biswas
12. Md. Sohan Mollah
13. Ms. Runa Khatun
14. Md. Julfikar Ali
15. Md. Lutfar Rahman Biswas

Annex II: Priority-wise Income Classification



Annex III: Farmers Income in Sadullahpur Village



Annex IV: Area of Major Crop and Irrigation Use and Fertilizer Use in Major Crops

Area of Major Crop and Irrigation Use

| Crops | Total Area (ha) | % of Area Irrigated | % of Area Rainfed |
|-----------|-----------------|---------------------|-------------------|
| T. Aus | 32 | 20 | 80 |
| T. Aman | 35 | 8 | 92 |
| Boro | 30 | 100 | 00 |
| Vegetable | 1 | 100 | 00 |
| Lentil | 2 | 0 | 100 |
| Mustard | 3 | 35 | 65 |
| Potato | 1 | 100 | 00 |

Fertilizer Use in Major Crops

| Crops | Fertilizer Use (kg/hectare) | | | | | | | Number of Farmers Using Pesticides | Number of Farmers Using IPM |
|---------------|-----------------------------|--------------|-----|-----|-----|--------|----------------|------------------------------------|-----------------------------|
| | <i>Guti</i> Urea | Prilled Urea | TSP | DAP | MOP | Gypsum | Organic Manure | | |
| T. Aus HYV | 112 | | 155 | | 80 | 75 | 2000 | 70 | 75 |
| T. Aus Local | | 70 | 80 | | 60 | 40 | | 15 | 20 |
| T. Aman HYV | 112 | | 160 | | 85 | 60 | 2000 | 60 | 50 |
| T. Aman local | | 160 | 180 | | 50 | 30 | | 25 | 25 |
| Boro | 170 | 380 | 180 | | 130 | 60 | 1200 | 30 | 35 |
| Lentil | | 50 | 85 | | 40 | 30 | | 5 | |
| Potato | | 450 | 350 | | 440 | 160 | 5500 | 7 | 2 |
| Mungbean | | 40 | 120 | | 40 | 50 | | | |
| Mustard | | 80 | 110 | | 80 | 60 | | | |
| Cabbage | | 280 | 250 | | 70 | 60 | 1000 | | |
| Cauliflower | | 270 | 250 | | 70 | 55 | 1000 | | |