Local Government Engineering Department
Community Based Resource Management Project

Agriculture Impact Study Report

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Community Based Resource Management Project (SCBRMP)
IFAD Loan # 567-BD

Acronyms

AI	Artificial Insemination
ALART	Advanced Line Adaptive Research Trial
ASC	Agriculture Support Coordinator
BADC	Bangladesh Agriculture Development Corporation
BARI	Bangladesh Agricultural Research Institute
BRRI	Bangladesh Rice Research Institute
BLRI	Bangladesh Livestock Research Institute
CO	Credit Organization
CDF	Community Development Facilitator
CSO	Chief Scientific Officer
DAE	Department of Agricultural Extension
DDAE	Deputy Director of Department of Agricultural Extension
FGD	Focused Group Discussion
HYV	High Yielding Variety
IFAD	International Fund for Agriculture Development
PD	Project Director
PP	Project Proforma
PMU	Project Management Unit
PSO	Principal Scientific Officer
PRA	Participatory Rapid Appraisal
PVS	Participatory Variety Selection
SAAO	Sub-Assistant Agriculture Officer
SCBRMP	Sunamgonj Community Based Resource Management Project
SDC	Swiss Agency for Development Corporation
SO	Scientific Officer
SMS	Subject Matter Specialist
SSO	Senior Scientific Officer
SUPM	Senior Upazila Project Manager
TA	Technical Assistance
TOR	Terms of Reference
TK	Taka (Bangladesh currency)
UAO	Upazila Agriculture Officer

Cropping seasons:

Kharif II	Mid July to mid October (monsoon)
Rabi	Mid October to Mid March (winter/dry)
Kharif I	Mid March to Mid June (pre-monsoon/intermittent rainfall with chances of occasional hailstorms)

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Executive Summary

Introduction

The CBRMP is being implementing technology transfer activities in the field through adaptive research trials along with technology training, demonstrations and pilot production program since 2005. Introduction of new varieties of different selected (suitability tested by field trials) crops was initiated in coordination with BRRI, and BARI. The study is conducted to investigate the improvement in uptake of crop production technologies among the beneficiary communities. The primary information was collected from project supported and non-supported farmers and their improvement in livelihoods and technology uptake measured by comparing pre and post project status. The information was collected from 390 samples of which 50% project supported & rest 50% non-supported households and 235 male and 155 females. The samples were grouped by crops like boro rice farmers, wheat farmers, mustard farmers and so on as project support concentrated on different crops suitable for the locality. The interpretation of results is made separately for farmers as per crops growing and also for across all samples. The findings of the study are summarized in following section.

Possession of Land

The area of cultivated land under project-supported farmers was found less than the project non-supported farmers as project worked with the poorer section of the society. The project farmers had 195 decimal cultivated lands per households, which they have increased to 259 decimal (33%) after project intervention. The non-supported farmers had 212 decimal lands per household that they changed to 294 decimal (38%) at present. In both groups, the increase is mainly contributed by lease and share cropping area and it was more pronounced for non-project farmers as they had no or little lease/sharecropping land before project starts (earlier).

When the progress or improvement in area of land asset is compared by group of farmers as per crops grown, it has been observed that mustard farmers greatly increased (144%) their occupancy in land asset followed by T. aman farmers (47%), potato (32%), boro farmers (28%) and so on. In

Jamalgonj Upazila vast area of land in several haors came under cultivation of mustard, which reflected in the area change of mustard farmers. The project successfully introduced some new varieties of T. Aman rice like BRRI dhan 33, BRRI dhan 44, and BRRI dhan 46 after adaptive trials. The area of those varieties has been increased due to seed support programs of the project. The increase of T. Aman rice area reflected extension of those varieties in the project area. In boro rice no such variety could be introduced after several PVS trials, so the area increase is found as usual and mostly similar for both project and non-project farmers.

Change in Cultivated Area of Crops

The study measured the changes in cultivated area of selected supported crops. It has been observed that cultivated area of crops increased for both project and non-project farmers with time. Considering project-supported farmers, the area of boro rice cultivated by each of the households was 161 decimal, which increased to 206 decimal after project intervention. Non-supported farmers cultivated 170 decimal boro lands per family earlier, which changed to 213 decimal after project. Similarly the T. Aman rice area cultivated per family was 92 decimal and changed to 136 decimal after project for supported families. The control farmers had 102 decimal cultivated land of T. Aman that changed to 168 decimal at present. Cultivated lands of wheat was 35 decimal & 42 decimal before and after project for project beneficiaries while it was 38 decimal and 40 decimal for non-project farmers. Project farmers had 16 decimal potato lands earlier that changed to 20 decimal at present, they cultivated 23 decimal mustard lands earlier that changed to 55 decimal. Similar trends of increase in area of cultivated lands for different crops observed for non-supported groups.

Change in Crop Yield

The yields of crops under study (the project intended to promote) were highly encouraging. The mean yield increase for project farmers is found as 100% against 91% for non-project farmers. The yield of mustard for project farmers was 0.58 t/ha before project intervention that changed to 1.53 t/ha (166%) after project. Similarly the yield of mustard for non-project farmers was 0.57 t/ha that changed to 1.27 t/ha (125%). Yield of boro rice for project & non-project farmers were 3.39 t/ha & 3.31 t/ha respectively before project and 6.32 t/ha & 5.87 t/ha after project with a change of 86% & 77% respectively. Yield of T. Aman rice for project farmers changed from 3.15 t/ha to 4.68 t/ha

(48%); on the other hand the yield of T. Aman for non-project farmers changed from 3.01 t/ha to 4.61 t/ha (53%). Yield of potato not increased as of other crops the range of change was 36% to 45%, the possible reason is non-adoption of HYV as expected due to unavailability of seed in local market and the crop itself deserves high investment (seed and fertilizer cost).

Cropping Pattern

Double-cropped area for the project farmers increased by 54% (Boro followed by T. Aman) and 15% (T. Aman followed by rabi crops). Single cropped area for boro rice increased by 13% while T. Aman increased by 23%. The numbers of beneficiary for single T. Aman crop reduced by 49% while T. Aman followed by rabi crops (double-crop) increased by 170%.

Of 390 samples 35 had fallow land with an average area of 70 decimal per family that reduced to 25 decimal after project intervention. The fallow land mostly cultivated by rabi crops, boro rice and T. Aman rice. It is to be mentioned that the project mostly worked on improving cultivation of rabi crops (mustard, wheat, potato, sweet gourd etc.) in the district.

Crop Variety

None of the farmers were using HYVs in wheat, potato, mustard, and sweet gourd before project but the scenario has been greatly changed after project intervention. It is observed that 13% of farmers are using HYV in wheat, 12% using HYV in potato, 10% using HYV in mustard, and 17% using HYVs in sweet gourd. The use of HYVs in boro rice has also been changed from 20% to 73% and in T. Aman 27% to 49%.

Family Income

The average annual income of marginal farmers across project area is found as Tk 26,750/- while the income of small farm families is Tk 48,125/-. The highest annual income of the small farm families observed from Sadar Upazila (Tk 52,500/-) followed by Jamalgonj (Tk 49,000/-), Biswamberpur (Tk 47,000/-) and South Sunamgonj (Tk 44,000/-). The highest annual income of the marginal farm families also observed from Sadar Upazila (Tk 28,500/-) followed by Biswanberpur (Tk 28,000/-), Jamalgonj (Tk 26,500/-) and South Sunamgonj (Tk 24,000/-).

2. Introduction

The Community Based Resource Management Project (CBRMP) planned to investigate the improvement of livelihoods of project beneficiaries in respect of productivity, production, income, consumption and sustainability of crop and livestock enterprises due to agricultural intervention of the project. This study Report is prepared in response to the work order and ToR offered to the consultant for the impact study.

As elaborated in the ToR **(Annex I)** the Project (CBRMP) has been operating its activities since early 2003 in Sunamganj with an aim at reducing poverty of the poor through an integrated approach combining five components where agriculture and livestock production development is a major one. The component is being implemented with assistance of a few national research institutions and local extension departments under close supervision of Project's Agriculture Consultant along with a few specialized regular staffs. The objectives of the component are to address the problems in local agriculture, introduce improved varieties of crops and assist the farmers to increase production through better crop and farm management in sustainable manners.

Meanwhile the project has introduced many crops through participatory variety selection including early variety of Boro rice, improved T Aman and other winter/summer crops for cultivating after T Aman considering feasibilities and demand of farmers.

After working around 6 years, now the time has reached appraise the results of the technologies provided by the project to farmers and thereby to develop an uptake plan for extension of feasible technologies and crop varieties.

The study looked after the overall changes achieved on crop varieties, input use, yield of crops, in the project area due to project activities/intervention.

2.1 Objective of the study

This study is the downstream of previous inputs towards improving crop and farm management. The objective of the study is to assess the impact of the crop technologies that have been introduced in SCBRMP, in terms of productivity, production, income, consumption and sustainability of the crops.

The specific crop introduction sub-programs to be covered by the study will be:

- To study the adoption pattern of identified/selected crops in the project area
- To measure the changes in technology use by the beneficiaries due to project intervention
- Giving selection of early variety Boro rice with further instruction to efficient management
- Giving selection of improved variety T Aman with further instruction to efficient management
- Giving selection of winter/summer crops for fallow land cultivating after T Aman with further instruction to efficient management

Approach and Methodology

3.1 The Study

The field study has been designed and conducted through participatory data collection methods, including in-depth interview and focus group discussions during the month of March – May 2010. The simple sample survey techniques have been applied to collect the data. The study was carried out in four Upazilas where the project started functioning since inception and introduced maximum numbers of crops. During the study only potential crops (identified through adaptive research) have been taken into consideration to evaluate the introduction of improve production techniques into the farmers. To measure the improvement, the production data of survey farmers have compared against national data of similar crops. Major comparison was made using the data of control framers (without project support who practiced similar varieties of crops in the same seasons) with the data generated from project's supported farmers.

3.2 Data Collection

Sample is drawn on random basis following the standard rules. For data collection a semi-structured interview format showed in **Annex II** has been used including FGD to focus on specific issues and to draw popular consensus. Two FGD sessions have been conducted in each of the sampled Upazilas and interaction made with project-supported farmers of the locality. As enumerated in the ToR the project provided necessary staff for interviewing and mobilizing farmers and conducting FGD. The concern Upazila provided necessary staff for interviewing and conducting FGD. The interview data checked and verified by the SMS agriculture and SMS socio-economics. Further they prepared the FGD report of the Upazila as well. All data have been complied and registered by research Associate under the instruction of the consultant. The consultant analyzed the data with the assistance of associates and a reputed computer programmer.

Field data are collected following in-depth interview using pre-designed semi-structured questionnaire as mentioned above. Technique of household survey has applied to perform in-depth interview. In-depth interview is done to generate both quantitative and qualitative

information while the focus group discussion (FGD) produced qualitative data only. To make valid interpretation in multiple aspects of target farmers information was collected using different possible sources. However the whole process of in-depth interview was a highly technical matter and it was not easy to get accurate information from farmers who are not aware of research methods. As such skilled staff were engaged in data collection process and training of enumerators on questionnaire and survey methods has been properly done before fielding the study. The survey tool and check list for FGD sessions have been attached as **Annex II and Annex IV.**

a) In-depth Interview

In-depth interview has been conducted to collect qualitative as well as some necessary quantitative data from the sampled farmers. Interview guideline or semi-structured questionnaire was used to generate information systematically. Technique of sampled survey has applied to carry out the study.

b) Focus Group Discussions

FGDs were conducted in order to have a general perception of farmers/stakeholder's views and thoughts regarding the improvement of crop production, intensity of cropping, use of good/quality seeds or fertilizers and as a whole income from farming per family. The assigned staff, who were senior agriculturist held FGD with groups of farmers in each of the locations. In each Upazila there were two FGD sessions and the total sessions conducted are 4 x 2 = 8 in all four sites. For FGD the farmer's group constituted by 20 participants who are the members (60%) and non-members (40%) of CO to conceive their ideas and perspective on the agricultural activities done by the project since 2005.

A checklist was used to ensure similarity in information gathering from all location. After collecting information through open ended discussion type dialogue with the households, the information in a manner of sense and made some simple tables and interpreted with a view to elaborate the facts in respect of people's views. The main focus of FGD was to assess the thoughts and views of people to the project operation in respect of adaptive research on crops, demonstration and training activities to improve their livelihoods. The information collected has been used to validate the findings of household survey.

3.3 Sampling Plan

3.3.1 Populations for study

The contact farmers for each crop from the four target upazilas were pooled for the purpose of sampling, analysis and reporting. Sampling and analyzing the upazilas as separate units was not done as it could have been greatly increased the total sample size and workload.

3.3.2 Levels of precision and confidence

To keep sample size and workload as small as possible, modest levels of confidence and precision have been kept. A 1-tailed confidence limit of 10% of the mean (for yields) or 10 percentage points (for adoption rates), estimated with 90% confidence, required an unadjusted sample of 41 assuming a variance of 50% of the mean.

3.3.3 Actual Sample Sizes

The number of farmers per crop was quite small (maximum is 382 for the Mustard sub-program). Consequently the standard sampling procedures permitted some reduction from the theoretical sample size of 41 under the finite population correction (fpc). The amount of reduction depended on the total of farmers for each individual crop, as follows:

Boro rice	29
T. Aman	25
Wheat	22
Potato	25
Mustard	23
Sweet gourd	30
Homestead gardening	36

3.3.4 Sample Selection Procedure

The sample members were selected by linear systematic sampling (LSS). The procedure is as follows:

- for the first crop (Mustard), form all the upazila-wise farmer lists into a single list, numbered from 1 to the total farmers in the list;
- the total farmers for the first crop were divided by the required sample size, rounded down to the nearest whole number. This is the stepping interval;
- a random number then selected between 1 and the stepping interval (this can be done with the ()RAND function in Excel). This is the random start point;

- the sample for the farmer whose number corresponds to the random start point is selected, the random start point + 1 stepping interval, random start point + 2 stepping intervals, etc., until the desired sample size is reached.
- the procedure is repeated for all crops, starting the list at 1 for each crop.

Following the procedure depicted above the sample table for the study is as follows:

Table 2.1: Sampling for SCBRMP Crop Programme Study 2010

Crop	Target population	Sample Size	Stepping interval	Random start
Boro rice	382	29	10	3
T. Aman rice	185	25	5	5
Wheat	376	22	10	5
Potato	96	25	3	3
Mustard	86	28	3	2
Sweet Gourd	80	30	3	1
Homestead gardening	124	36	4	2
Total	1413	195		

3.3.5 Reserve Samples

Provision of reserve samples was made because if a sample farmer is unavailable at the time of survey, the next farmer above or below him/her in the list is to be selected. For example if farmer 53 in the Mustard sub-program is absent/sick/dead, farmer 52 or farmer 54 is to be interviewed. Field staff conducting the interviews was provided with a copy of the master-list for each crop so that they can identify sample members.

3.3.6 Control Samples

The ToR of the study proposed use of control samples to estimate the amount of change due to SCBRMP support. The questionnaire asked the supported farmers how much their yields and crop area have changed since they received project support, but if the control samples have also shown improvement then we must conclude that some of the change is due to non-project factors.

The changes against improvement indicators (crop areas, crop production, technology use etc.) of farmers in the control were compared as possible to the farmers in the supported samples, in all respects except provision of project support. The best way followed to ensure this: randomly selected farmers growing the same crop, from each village where a farmer from the supported

sample is located. To do this, a list of suitable farmers from each concerned village was compiled. To do this a focus group of knowledgeable local farmers (done in the same focus group used for discussion of crop program impacts) was conducted. Once the list has been compiled, a simple 'lottery' sample was done to select a control farmer at random. The names of all suitable farmers wrote on slips of paper, shake them up in a bag, and asked a young boy to pick out one slip with his eyes closed.

Samples were drawn from CO members while control samples from non-CO members. The sample distribution including control samples is given in the following table. The control samples were taken to eliminate the on-going changes (improvement) occured due to time factor; it has added accuracy to the data collection method. Two FGDs are conducted in each Upazila.

3.3.7 Distribution of Sample

The following table showed the sample distribution by crops and upazila.

Table 2.2: Sample distribution by crops and Upazilas

Sl. No.	Name of Crop	Upazila										
		Sadar		Jamalganj		S. Sunamganj		Biswambarpur		All		
		Project	Control	Project	Control	Project	Control	Project	Control	Project	Control	Tot
1	Boro rice	4	4	4	4	0	0	23	23	31	31	62
2	T. aman rice	7	7	3	3	0	0	17	17	27	27	54
3	Wheat	13	13	2	2	2	2	4	4	21	21	42
4	Potato	16	16	3	3	4	3	2	2	25	24	49
5	Mustard	0	0	16	16	1	1	3	3	20	20	40
6	Sweet gourd	16	16	3	3	5	5	6	7	30	31	61
7	Homestead gardening	15	15	0	0	15	14	11	12	41	41	82
	All	**71**	**71**	**31**	**31**	**27**	**25**	**66**	**68**	**195**	**195**	**390**

4 Transfer of Knowledge (Training)

The consultant with the assistance of associates organized day-long training program for the involved project's officers and field staff on the procedure of data collection. The survey tools and

the FGD checklist was discussed in the training class so that all enumerators would have the similar understanding on the output of each of the questions.

5 Field Testing of Questionnaire

The questionnaire was shared with the SMSs agriculture and agriculture coordinator of the project. After including suggested inputs of project officials a field-testing session organized by the consultant and interviewed four farmers in sadar upazila. After the testing session the necessary changes were made and finalized the questionnaire for multiplication.

6 Study Location

The study was confined to the locations where project started activities in 2005 i.e. in sadar, Jamalgonj, Biswamberpur and Tahirpur.

4. Findings of the Study

The impact study generated primary information from the field through household survey and focus group discussion. The project selected some potential crops through adaptive research trials and provided support to farmers to facilitate cultivation of those crops with improved production technologies like varieties, planting times, irrigation and other production practices. The study grouped the farmers as per crops grown like mustard cultivated farmers, boro farmers and so on. Investigation was confined on farmers of seven selected crops to find out mainly the technology uptake and yield improvement of crops under study. To avoid the development by time factor control farmers were interviewed with similar socio-economic base and who cultivated the same crops in the locality.

4.1 Demography of Respondents

To know the social status and their position i.e. representativeness of samples in the society some demographic characteristics of sampled farmers (both project and non-project farmers) have been elaborated in the following sections.

4.1.1 Age and Sex Distribution

None of the sampled farmers including control ones were found below 20 years of age. Most of the samples (67%) distributed under active age group i.e. 30-50 years of age. 40% samples were within the most active age (30-40) and 27% fall under the age group of 40-50 years. Of the samples 60% were male and 40% female. Under female respondents 34% were within the age group of 30-40 years and 29% fall in 40-50 years of age. While in male respondents 49% sampled farmers were under the age group of 30-40 years and 25% found in 40-50 years of age. 20% of females were above 50 years of age but only 9% male cross the age of 50 years. The male do the hard and laborious jobs/works than the females so the distribution is quite logical.

Table 4.1: Age and sex distribution of the respondents

Sl #	Age Group	Male	Female	Total
1	20-29	40 (17)	26 (17)	66 (17)
2	30-39	79 (34)	76 (49)	155 (40)
3	40-49	69 (29)	38 (25)	107 (27)
4	50 or above	47 (20)	15 (9)	62 (16)
All		235 (100)	155 (100)	390 (100)

4.1.2 Education Status

Year of schooling of sampled farmers was investigated and found that irrespective of sex 59% had no formal education, 26% completed primary education (up to class five), 6% acquired high school education, and 4% passed SSC, 2% HSC and 2% above HSC. The following table 4.2 segregated the project and control samples by their education levels. Both group of samples showed mostly similar education background but the project farmers are found little bit better off than non-project farmers in respect of illiteracy i.e. 57% project samples had no schooling against 61% in non-project samples. 29% project samples had primary education against 45% in non-project farmers.

Table 4.2: Education of the respondents by project sample and control sample

Sl #	Education	Project	Control	Total
1	No schooling	111 (57)	118 (61)	229 (59)
2	Up to class V	57 (29)	45 (23)	102 (26)
3	Up to class X	12 (6)	12 (6)	24 (6)

4	SSC pass	5 (3)	12 (6)	17 (4)
5	HSC pass	5 (3)	5 (3)	10 (2)
6	Above	5 (3)	5 (3)	10 (2)
Total		195 (100)	195 (100)	390 (100)

4.1.3 Family Size

The following table 4.3 summarized the information of family size of the sampled farmers either non-project or project supported ones. Family size of the sampled farmers was comparatively larger and in fact no variation observed between project and non-project samples. Only 4% farmers had family members of 1 or 2. A sizeable numbers of respondents (19%) had ideal family size i.e. 3-4 members. Maximum numbers of sampled farmers (36%) had family size of 5-6 members. 26% respondents have large family (7-8 members) and 15% have larger family who have more than 8 members in their family. In haor belt people are living in a concentrated area due to difficulty to find space for housing, so large family size is not uncommon. The table 4.3 below elaborated the family sizes of both project and non-project respondents.

Table 4.3: Family size of the respondents by project sample and control sample

Sl #	Family size #)	Project	Control	Total
1	1 to 2	6 (3)	7 (4)	13 (4)
2	3 to 4	43 (22)	29 (15)	72 (19)
3	5 to 6	60 (31)	81 (42)	141 (36)
4	7 to 8	51 (26)	51 (25)	102 (26)
5	>8	35 (18)	27 (14)	62 (15)
	All	195 (100)	195 (100)	390 (100)

4.1.4 Marital Status

Of the total sampled farmers without considering project or non-project ones 94% are married and only 6% unmarried. Of the project samples 92% respondents are married and 8% unmarried. On the other hand among the non-project samples 95% were married and 5% unmarried. It indicated that almost 100% of the sampled farmers were stable households of the area. It is expected that the data generated from these samples are mostly representative of the locality.

Table 4.4: Social status of the respondents by project sample and control sample

Sl #	Social status	Project	Non-project	All
1	Married	179 (92)	186 (95)	365 (94)
2	Unmarried	16 (8)	9 (5)	25 (6)
All		195 (100)	195 (100)	390 (100)

4.1.5 Distribution of Respondents by Religion

The sampled respondents were grouped by religion and it has been observed that out of 390 samples 310 (79%) are Muslims, and 80 (2%) Hindus, no Buddhist and Christians found in the locality. Respondents were equally distributed into project and non-project samples by region. Detailed are shown in the following table 4.5.

Table 4.5: Religion of the respondents by project sample and control sample

Sl #	Religion	Project	Control	Total
1	Muslim	156 (80)	154 (79)	310 (79)
2	Hindu	39 (20)	41 (21)	80 (21)
Total		195 (100)	195 (100)	390 (100)

4.1.6 Primary Occupation

The sampled respondents are plotted in the following table 4.6 by their primary occupation. Virtually no occupational variation observed between project and control samples. Majority of the respondents (72%) are involved in agriculture farming followed by housewife (18%), service (2%) and day laborer (1%). Of the samples 40% are female and 18% found housewife it means many of the women are actively involved in business or any other profession and contributing to family earnings. Detailed information is shown in the following table 4.6.

Table 4.6: Primary occupation of the respondents by project sample and control sample

Sl #	Primary Occupation	Project	Control	Total
1	Agriculture	137 (70)	145 (74)	282 (72)
2	Business	14 (7)	12 (6)	26 (7)
3	Housewife	36 (18)	33 (17)	69 (18)
4	Day Labour	1 (1)	3 (2)	4 (1)
5	Service	6 (3)	2 (1)	8 (2)
6	Carpentry	1 (1)	0 (0)	1 (0)
All		**195 (100)**	**195 (100)**	**390 (100)**

4.2 Changes in Farming Systems

The study investigated the major changes occurred in farming systems and livelihood patterns of project beneficiaries and compared these changes with non-project farmers to measure the actual improvement achieved among the farm families by project intervention. The data plotted and analyzed in the following sections compared the variation of changes found between project and non-project beneficiaries. To do so control samples are drawn from farm families who grown the same crop in same location and did not get any project support during last five years. But the enumerator faced difficulty to find control farmers with similar socio-economic base as of project beneficiaries. It happened as the project worked with poor communities and included most of the farm families with similar socio-economic base of that locality. Another problem was that agriculture extension activities did not strictly confine with the CO (credit organization) members because all the credit members were not equally potential farmers. As a result enumerators compelled to pick control samples from little bit of upper level farmers than the project samples. For project samples the enumerators collected information only from the listed (pre-selected samples) farm families but for control samples, data collected from the neighbors by the enumerator as such all of them (control farmers) were not as poor as the sampled farmers.

It is logical that the responses of farmers with higher socio-economic base will be different than that of lower resource base. So the results discussed in the following sections are not always better with project supported households, sometimes control farmers with higher resource base showed better improvement than the project beneficiaries.

The project provided support to some of the selected crops after evaluating their performances in the project area through adaptive research trials. For quick extension of crop technologies the project initiated technology demonstration and seed supported production program to those

selected crops. The study investigated outcomes of project supports as per crop, so grouped the farmers accordingly for sampling as a) Boro rice farmers b) T. Aman rice farmers c) Wheat farmers d) Potato farmers e) Mustard farmers f) Sweet gourd farmers and g) Homestead farmers.

4.2.1 Boro Rice Farmers

The project beneficiaries who received adaptive trials, demonstrations and input support production program on boro rice were listed and sampled from four Upazilas to determine their improvement in respect of technology uptake, family asset and financial strength. The changes in crop production technologies of boro farmers are discussed separately in the following sections.

a) Changes in Use of Agriculture Input

The study investigated the changes in use of input in boro rice by the project beneficiaries. It has been observed that significant changes have been attained by the beneficiaries in respect of investment against fertilizer, pesticide and irrigation in cultivating boro rice (Table 4.7). Instead 235 kg urea applied earlier by project farmers now they are using 377 kg per ha. Similarly they are using TSP @ 98 Kg/ha, MP @ 56kg/ha instead of 52 kg/ha and 33 kg/ha respectively. On the other hand the non-project farmers are using urea @ 224 kg/ha, TSP @ 69 kg/ha, and MP 37 kg/ha instead of 135, 35 and 16 kg/ha urea, TSP and MP respectively used during pre-project time.

The data showed that comparatively large farmers (control) are using much less amount of fertilizers in their rice field than the poor farmers (project beneficiaries). The data revealed that the project farmers were using higher dose of fertilizes than the control farmers before project intervention, which is unusual. The rate of change in fertilizer use is found little higher with control farmers but considering the amount using/ha at present is found much higher with project farmers. Comparing with control farmers the project beneficiaries are using 113 kg excess urea per ha, 29 kg TSP and 19 kg MP per ha, which can be considered as good impact of project activities. The investment of irrigation and pesticide to rice is also found higher with project beneficiaries.

The following table 4.7 summarized the changes in input use by project beneficiaries and non-project beneficiaries.

Table 4.7: Changes in use of agriculture input by farmers who cultivated boro rice

Use of agriculture	Project beneficiaries	Non-project beneficiaries

input (kg/ha)	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Urea	235	377	60	135	224	65
TSP	52	98	91	35	69	97
MP	33	56	69	16	37	125
Irrigation (Tk/ha)	1904	4108	116	1692	4374	158
Pesticide (Tk/ha)	755	1804	139	618	2094	239

b) Changes in Plant Protection Measures

The following table 4.8 showed that control farmers are investing slightly more resources for insecticide than project beneficiaries while project farmers investing more money to use fungicide than the control farmers in cultivating before rice. However it is important to note that the farmers either project or non-project was using insecticide and fungicide in the rice production before project intervention. The major changes (20%) showed by project farmers in using fungicide was due to use of bavistin in seed treatment of rice to control bakanae disease, which project promoted through massive demonstration.

IPM is being used by both control and project farmers in a limited scale and confined in placement of some sticks in the rice field to attract birds to sit on, so that some larva or moths to be eaten by them, which commonly termed as birds perching. Another IMP practice mentioned by some farmers is pulling of long strings soaked by kerochin on top of the rice field. The cost calculated as Tk 50/- per 30 decimal (care).

Table 4.8: Changes in use of plant protection measures by farmers who cultivated boro rice

Plant protection measures	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Insecticide (cost/ha)	893	1271	42	980	1416	44
Fungicide (cost/ha)	686	823	20	618	648	5
IPM (cost/ha)		412			412	
All (cost/ha)	865	1432	66	964	1536	59

c) Changes in Homestead Resource

Before project intervention the income from homestead by selling egg, poultry and other household products was Tk 4325/- per family per year for project farmers who cultivated boro rice while for non-project farmers it was Tk 4000/-; slightly lower than the project samples. After project

intervention the income of project farmers increased by 94% and non-project farmers by 85% but per family homestead income for project farmers is still found 12% higher than the non--project farmers. The income from vegetable production and nursery plantation is also found higher for project farmers than the control farmers and the rate increase by project intervention is higher for project beneficiaries. The project farmers have income from selling of compost but control farmers lacked of such income. It is unusual as the project farmers have generally fewer numbers of livestock and poultry. For project farmers the total homestead income increased by 108% while for non-project farmers it increased by 83%. The achievement is highly encouraging. Table 4.9 showed detailed of homestead income per family before and after project intervention.

Table: 4.9: Changes in use of homestead resource by farmers who cultivated boro rice

Use of homestead resource	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Income of homestead (T/yr)	4325	8375	94	4000	7380	85
Vegetable production (Tk/yr)	1500	3165	111	1297	2414	86
Nursery development						
Plantation of fruit trees (Tk/yr)	1780	3780	112	1320	2500	89
Compost production (Tk/yr)		1500				
All	3169	6581	108	2156	3519	83

d) Changes in Land Asset

The changes in land asset of boro-supported farmers are summarized in the following table 4.10. The averaged size of own cropland under control households i.e. with non-project (without project support) farmers is found larger (238 decimal per household) than the size of own cropland (232 decimal per household) of project-supported farmers. During the project period the project beneficiaries have increased the size of own cropland by 25% against 28% of control farmers. In contrary to own crop land, size of homestead land of project farmers increased by 8% against 0.5% of control households. Great achievement has been observed among project beneficiaries in increasing the area of share cropping land (67%) than control samples (00%). The project farmers acquired greater area (30 decimal per family) of leased land against no improvement in control farmers. However considering all categories of land asset the changes in project-supported farmers is found as 25% against 24% in control farmers. The project beneficiaries showed better improvement than non-project farmers in all categories of land asset except own cropland. As mentioned earlier the control farmers were comparatively large farmers than the project supported

ones so they had better resources to buy cropland. However sharecropping and Leasing of land are the first step to improve livelihoods of the family.

Changes in homestead land is very important in haor areas because this land is highly expensive and project beneficiaries are became more involved in share cropping, which supports their improvement in financial strength.

Details of the changes are shown in the following table 4.10.

Table 4.10: Changes in land asset of farmers who cultivated boro rice

Category of land (decimal)		Project beneficiaries			Non-project beneficiaries		
		Pre-project	Post project	% Change	Pre-project	Post project	% Change
1	Homestead	17	18	8	17	17	(0.53)
2	Crop land – own	232	289	25	238	305	28
3	Crop land – leased		30				
4	Crop land - share crop	180	300	67	210	210	00
	All	247	309	25	279	346	24

4.2.2 T. Aman Rice Farmers

The project beneficiaries who received adaptive trials, demonstrations and input support production program on T. aman rice were listed and sampled from four Upazilas to determine their improvement in respect of technology uptake, family asset and financial strength. The changes in crop production technologies of T. Aman farmers are discussed separately in the following sections.

a) Changes in use of Agriculture Input

Enormous changes have been observed in use of fertilizers by both project and non-project beneficiaries in cultivating T. Aman. But greater change found with project beneficiaries. The project supported farmers were using urea @ 170 kh/ha (69 kg/ac or 23 kg/bigha), TSP 45 kg/ha, and MP 35 kg/ha during pre-project period. After project intervention the amount of fertilizer application has been changed to: urea @ 281 kg/ha (65%), TSP 113 kg/ha (151%) and MP 87 kg/ha (153%). The non-project beneficiaries have also improved the fertilizer rate in T. Aman by 50% for urea, 94% for TSP and 61% for MP. The beneficiary farmers showed significantly higher changes than the non-beneficiary farmers.

Increased investment has also been seen in irrigation and pesticide application. The project intervention facilitated the use of pesticide and irrigation in T. Aman rice whenever necessary.

The following table 4.11 showed the changes in input use by project and non-project farmers in T. Aman.

Table 4.11: Changes in use of agriculture input by farmers who cultivated T. Aman rice

Use of agriculture input (kg/ha)	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Urea	170	281	65	171	257	50
TSP	45	113	151	42	82	94
MP	35	87	153	41	66	61
Irrigation (Tk/ha)	599	765	28	545	677	24
Pesticide (Tk/ha)	823	1764	114	782	1561	100

b) Changes in Plant Protection Measures

The project beneficiaries increased the use of insecticide in T. aman by 38% against 33% increased by non-project farmers. In case of fungicide use the project farmer increased by 2% while the non-project farmers showed negative growth. It's not clear why non-project farmers reduced the use of insecticide. 2% increase in fungicide does not fully match with the project intervention because it introduced seed treatment to control bakanae disease and it has been observed from other table that the mount of fungicide use greatly increased but unlike not reflected in the following table 4.12.

Table 4.12: Changes in use of plant protection measures by farmers who cultivated T. Aman rice

Plant protection measures	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Insecticide (cost/ha)	1086	1498	38	1017	1357	33
Fungicide (cost/ha)	823	841	2	755	727	(4)
IPM (cost/ha)		412				
All (cost/ha)	1070	1619	51	978	1088	11

c) Change in Use of Homestead Resource

Before project intervention the income from homestead by selling egg, poultry and other household products was only only Tk 600 per family per year for project farmers while for non-project farmers

it was Tk 1650/-; almost three times higher than the project samples. After project intervention the income of project farmers increased by 108% and non-project farmers by 52% but per family homestead income for non-project farmers is still almost double than the project farmers. The project farmers are low-income group of the society, which is the possible reason for this kind of disparity. The income from vegetable production and nursery plantation is also higher for control farmers than the project farmers but the rate increase by project intervention is higher for project beneficiaries. The control farmers have income from selling compost but project farmers lacked of such income. It is usual as they have fewer numbers of livestock and poultry. It is difficult to explain why non-project farmers have good income from nursery production when the project supported nursery development for the project beneficiaries. Table 4.13 showed detailed information.

Table 4. 13: Changes in use of homestead resource by farmers who cultivated T. Aman rice

Use of homestead resource	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Income of homestead (Tk/yr)	600	1250	108	1650	2500	52
Vegetable production (Tk/yr)	1142	2200	93	1719	3253	89
Nursery development (Tk/yr)				1600	4750	197
Plantation of fruit trees (Tk/yr)	1438	2067	44	2615	3764	44
Compost production (Tk/yr)				900	1234	37
All	1703	3295	93	3921	8872	126

d) Changes in Land Asset

As observed with boro rice farmers, the changes in size of own crop land for control samples of T. aman famers was higher (38%) than the project beneficiaries (24%). The control farmers also had better changes (4%) in case of homestead land than the project supported ones (2%). The project samples showed better changes in sharecropping (110%) and leased in land (77%) than the contro samples.

The mean changes in land asset of project samples were 33% against changes of control farmers (23%). Before project intervention the area of own crop land per household was 151 in project samples while 132 in control samples. After project intervention the size of own cropland increased to 187 decimal per household for project famers and 182 decimal for control samples. The area of homestead land has also been increased 6% for control and 2% for project samples. But in lease and sharecropping land the increase of project samples is much higher than the control samples. It indicated that the capacity of project beneficiaries (supported farmers) has been increased to get lease or have cultivate more land under sharecropping but purchasing of land by utilizing the

resources from cultivation of large area (lease & share cropping) of land would take some more time.

Details of changes in land asset of samples are plotted in the following table 4.14.

Table 4.14: Changes in land asset of farmers who cultivated T. Aman rice

Category of land (decimal)		Project beneficiaries			Non-project beneficiaries		
		Pre-project	Post project	% Change	Pre-project	Post project	% Change
1	Homestead	21	22	2	17	18	6
2	Crop land – own	151	187	24	132	182	38
3	Crop land – leased	100	183	83	77	80	4
4	Crop land - share crop	30	63	110	50	58	16
	All	171	114	33	69	85	23

4.2.3 Wheat farmers

The project beneficiaries who received adaptive trials, demonstrations and input support production program on wheat were listed and sampled from four Upazilas to determine their improvement in respect of technology uptake, family asset and financial strength. The changes in crop production technologies of wheat farmers are discussed separately in the following sections.

a) Changes in use of Agriculture Input

The following table 4.15 showed the changes of fertilizer use in Wheat by project and non-project farmers. The project farmers increased the use of urea by 40%, and TSP by 94%. The non-project farmers also increased the use of urea and TSP by 34% and 52% respectively. Investment in irrigation has been also been increased in wheat cultivation. The changes in input use in wheat have been found very positive as the project initiated seed support extension program of the crop. Many of the project farmers are found using MP @ 62 kg/ha in wheat what they did not use earlier. Similarly the non-project farmers are also using MP in what cultivation.

Table 4.15: Changes in use of agriculture input by farmers who cultivated wheat

Use of agriculture input (kg/ha)	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Urea	163	228	40	111	149	34
TSP	41	80	94	47	71	52
MP		62			53	
Irrigation (Tk/ha)	823	3561	333	1372	3923	186

Pesticide (Tk/ha)		1756			1647	

b) Changes in use of Plant Protection Measures

Use of insecticide and fungicide in wheat has also been increased by project and non-project farmers (Table 4.16). More insecticide has been using by the control farmers than the project supported ones. Project intervention increased the use of plant protection measures in both control and supported farmers and no significant difference observed between them.

Table 4.16: Changes in use of plant protection measures by farmers who cultivated wheat

Plant protection measures	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Insecticide (cost/ha)	1086	1357	25	1017	1498	47
Fungicide (cost/ha)	823	841	2	755	727	(4)
IPM (cost/ha)		412				
All (cost/ha)	1070	1619	51	978	1688	73

c) Change of Income in Homestead Resource

The mean income of homestead for project farmers was 31% higher than the control farmers. The higher income from homestead after project intervention for project farmers was mainly contributed by income from nursery development. Earlier than project activity the farm families had no income from nursery but after project they have earned Tk 10,000/- from nursery business. The project supported nursery development for producing seedlings of hijol & coros and purchased from beneficiary by Tk 10/- per seedling. The control farmers showed better improvement in homestead earnings in all other sectors except nursery development. The income from vegetable production increased by 100% for control farmers against 81% for project farmers, similarly income from plantation of fruit trees increased by 84% and 41% by control and project farmers respectively. The project farmers earned Tk 800/- per family from compost selling while the control farmers earned Tk 500/- per year.

Detailed of homestead income for control and project farmers has been plotted in the following table 4.17.

Table 4.17: Changes in income from homestead resource by farmers who cultivated wheat

Use of homestead resource	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Income of homestead (Tk/yr)	1933	3502	81	2000	4000	100
Vegetable production (Tk/yr)	1283	2479	93	1357	2669	97
Nursery development (Tk/yr)		10000				
Plantation of fruit trees (Tk/yr)	2571	3636	41	2250	4143	84
Compost production (Tk/ac)		800			500	
All	1929	4083	112	1869	2828	51

d) Changes in Land Asset

The wheat farmers showed better improvement in all categories of asset, the project supported group increased homestead land by 14%, and crop land by 18% against 0%, and 2% respectively in non-supported farmers. The supported farmers have increased their lease and sharecropping land (9%) than earlier. Irrespective of land categories the mean changes of land asset for supported farmers is found as 19% against 6% in control farmers. With time all farmers have change their land asset but supported ones showed higher possession of land than the control samples. It indicated that without project support there is progress but with project support the development is faster.

Details of the changes of land asset have been shown in the following table 4.18.

Table 4.18: Changes in land asset of farmers who cultivated Wheat

Category of land (decimal)		Project beneficiaries			Non-project beneficiaries		
		Pre-project	Post project	% Change	Pre-project	Post project	% Change
1	Homestead	15	17	14	14	14	00
2	Crop land – own	102	120	18	132	135	2
3	Crop land – leased		98		60	66	10
4	Crop land - share crop	100	109	9		67	
	All	72	86	19	68	71	4

4.2.4 Potato farmers

The project beneficiaries who received adaptive trials, demonstrations and input support production program on potato were listed and sampled from four Upazilas to determine their improvement in

respect of technology uptake, family asset and financial strength. The changes in crop production technologies of potato farmers are discussed separately in the following sections.

a) Changes in use Agriculture Input

The input use in potato farmers is shown in the following table 4.19. The rate of increase of fertilizers in potato filed was found higher with non-project farmers than the project farmers. The project farmers increased urea use in potato by 63%, TSP by 169% while the control farmers increased urea use by 68%, TSP by 385% and MP by 429%. It is not unlikely as the potato farmers are comparatively larger ones. The project supported the poor farmers who have increased the input use as per their financial capacity but the non-project farmer greatly increased input use due to better financial strength. Investment in pesticide and irrigation has been increased by 92% and 190% by project farmers.

Table 4.19: Changes in use of agriculture input by farmers who cultivated potato

Use of agriculture Input (kg/ha)	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Urea	167	272	63	384	647	68
TSP	41	111	169	41	200	385
MP		74		25	131	429
Irrigation (Tk/ha)	2058	3957	92	2294	3337	45
Pesticide (Tk/ha)	823	2388	190	1132	2233	97

b) **Changes in use of Plant Protection Measures**

Use of insecticide and pesticide in potato field by project and non-project farmers is summarized in the table 4.20. The project farmers increased insecticide use by 80% and fungicide by 57%. On the hand the non-project farmers increased the insecticide use by 67% and fungicide by 51%. Project farmers showed better performance than the non-project farmers. In potato cultivation use of fungicide and insecticide is very important for higher yield and project farmers realized it, which could be stated as success of project intervention.

Table 4.20: Changes in use of plant protection measures by farmers who cultivated potato

Plant protection measures	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Insecticide (cost/ha)	735	1321	80	652	1089	67
Fungicide (cost/ha)	676	1061	57	576	871	51
IPM (cost/ha)		679				
All (cost/ha)		618			412	

c) Changes in Income from Homestead

The earnings of homestead for potato farmers are summarized in the following table 4.21. The difference of income by pre and post project period is shown comparing project and non-project farmers. The homestead income for project farmers is found much higher (Tk 8184/-) than the non-project farmers (Tk 3779/-). The increase of income was higher with project farmers (319%) than non-project farmers (126%). The income of project farmers from vegetable sell was Tk 3188/- at present followed by fruit trees Tk 2963/- and compost Tk 800/-. Similarly the income of non-project farmers from vegetable was Tk 1778/-, fruit tree Tk 1607 and compost Tk 833/-. In all items the project farmers showed better improvement than the non-project farmers.

Table 4.21: Changes in income from homestead resource by farmers who cultivated Potato

Use of homestead resource	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Income of homestead (Tk/yr)	1300	3767	190	2100	4933	135
Vegetable production (Tk/yr)	1177	3188	171	812	1778	119
Plantation of fruit trees (Tk/yr)	957	2963	209	709	1607	127
Compost production (Tk/yr)	300	800	167		833	
All	1955	8184	319	1669	3779	126

d) Changes in Land Asset

The project-supported potato farmers were able to change their land asset by project intervention but could not be exceeded the progress made by control farmers (Table 4.22). The performance of control farmers found comparatively better than the project supported farmers. It is not unlikely as potato farmers are comparatively larger and better off than the marginal farmers. The project-supported households are poor and marginal farmers and potato farmers selected under control samples are larger ones, so logically the rate of development especially in case of land asset found better with control group.

The area of homestead land increased by 19% in project farmers against 20% in control farmers, similarly the area of crop land (own) increased by only 3% and 15% respectively in supported and non-supported households. If we consider leasing of land per family then supported group showed better changes (19%) than control families (6%). None of the sampled control farmers was

sharecropper before or after project intervention. On the other hand among the supported farmers the area of sharecropping per family increased by 18%.

The table 4.22 summarized the land asset data of potato farmers.

Table 4.22: Changes in land asset of farmers who cultivated Potato

Category of land (decimal)		Project beneficiaries			Non-project beneficiaries		
		Pre-project	Post project	% Change	Pre-project	Post project	% Change
1	Homestead	15	18	19	12	14	20
2	Crop land – own	199	205	3	174	202	15
3	Crop land – leased	156	186	19	160	170	6
4	Crop land - share crop	100	118	18			
	All	118	132	12	115	129	12

4.2.5 Mustard farmers

The project beneficiaries who received adaptive trials, demonstrations and input support production program on mustard were listed and sampled from four Upazilas to determine their improvement in respect of technology uptake, family asset and financial strength. The changes in crop production technologies of mustard farmers are discussed separately in the following sections.

a) Changes in use of Agriculture Input

The input use of mustard farmers is shown in the following table 4.23. It has been observed that before project intervention the farmers of the locality were using only urea in mustard but after project extension services through seed support both group of farmers started to use TSP and MP in mustard cultivation. The use of urea in mustard has been increased by 66% by project farmers and 33% by control farmers. The project farmers are using comparatively greater amount of TSP and MP than the control farmers.

Mustard extension was successfully done in Jamalgonj Upazila and maximum numbers of samples collected from that location. It could be assumed that the control farmers have also received indirect support from the project by getting seeds of improved variety from the neighbors who are project farmers. So the achievement found in the control farmers can be credited to the project intervention too.

Table 4.23: Changes in use of agriculture input by farmers who cultivated mustard

Use of agriculture input (kg/ha)	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change

Urea	183	305	66	124	165	33
TSP		130			204	
MP		122			185	
Irrigation (Tk/ha)		5489			4473	
Pesticide (Tk/ha)		2429			1482	

b) Changes in use Plant Protection Measures

As the project farmers used more input to their mustard crop they have also used more insecticide and fungicide in their mustard crop, which is quite logical. The non-project farmers have also increased the use of insecticide but not fungicide (Table 4.24).

Table 3.24: Changes in use of plant protection measures by farmers who cultivated mustard

Plant protection measures	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Insecticide (cost/ha)	1235	1441	17	638	723	14
Fungicide (cost/ha)		2470				
All (cost/ha)	1235	2676	117	638	723	14

c) Changes of Income from Homestead Resources

The present income from homestead resources per family per year was investigated for project and non-project farmers and compared it with their earlier incomes. The incomes of farmers who have grown mustard are summarized in the following table 4.25. It has been observed that the income from homestead of project farmers is higher than the control farm families. The following table showed very high income for project farmers at present that increased by 71% from previous income against 77% increase for non-project farmers. The mean income of homestead is Tk 11900/- for project farmers and TK 7237 for non-project farmers. The earlier incomes from homestead of those families were Tk 6945/- and Tk 4087/- for project and non-project farmers respectively. For project farmers the vegetable production contributed Tk 4289 and fruit trees Tk 2500/- and for non-project farmers vegetable production contributed Tk 2123/- and fruit trees Tk 2279/-. The earnings of homestead for project beneficiaries increased by 71% and non-project farmers increased farmers by 77%.

Table 4.25: Changes in income from homestead resource by farmers who cultivated Mustard

Use of homestead resource	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Income of homestead (Tk/yr)	2457	4975	102	1550	2850	84
Vegetable production (Tk/yr)	1783	4289	140	1104	2123	92

Plantation of fruit trees (Tk/yr)	1200	2500	108	834	2279	173
All	6945	11900	71	4087	7237	77

d) Changes in Land Asset

The mustard farmers who get support from project could not increase the area of their cropland or homestead land by project intervention during last couple of years. The data showed that mustard farmers are comparatively well off households with 23-26 decimal homestead land and 365-369 decimal of cropland per family. They are small farmers not marginal ones and need for land is more acute for the marginal group of farm families. This could be one reason that they were not very much eager to increase their land asset.

Irrespective of categories of land (lease, sharecrop etc.) the project beneficiaries increased the area by 21% (mostly due to leased land) compared to 14% in non-project farmers. At present mean land area per family for control farm families is found as 195 decimal while with project farmer it is 166 decimal.

The following table 4.26 summarized the data on land asset per family in project area.

Table 4.26: Changes in land asset of farmers who cultivated Mustard

Category of land (decimal)		Project beneficiaries			Non-project beneficiaries		
		Pre-project	Post project	% Change	Pre-project	Post project	% Change
1	Homestead	23	23	00	26	28	8
2	Crop land – own	365	363	0.54	369	380	3
3	Crop land - leased	0	98		200	280	40
4	Crop land - share crop	160	180	13	90	90	0.00
	All	137	166	21	171	195	14

4.2.6 Sweet gourd farmers

The project beneficiaries who received adaptive trials, demonstrations and input support production program on sweet gourd were listed and sampled from four Upazilas to determine their improvement in respect of technology uptake, family asset and financial strength. The changes in crop production technologies of sweet gourd farmers are discussed separately in the following sections.

a) Changes in use of Agriculture Input

Positive changes have been made by the project beneficiaries and control farmers in context of fertilizer use in sweet gourd. The project-supported farmers increased the use of urea by 67%, TSP by 29% and MP 100% in sweet gourd (Table 4.27). Comparing to project farmers control farmers achieved fewer changes in fertilizer use of sweet gourd. Between pre and post project the change was 32% for use of urea, 21% for TSP and 100% for MP. Higher investment has been observed with control and project farmer for irrigating the crop than earlier period, which found more with control farmers. The project farmers increased the use of pesticide in sweet gourd by 104% against 76% increase showed by non-supported families.

Sweet gourd is one of the popular crops in the district and the project introduced modern varieties through adaptive trials and made extension program following seed support activities. The data summarized in the table below showed good progress of beneficiary farmers in respect of technology uptake like fertilizer, pesticide and irrigation.

Table 4.27: Changes in use of agriculture input by farmers who cultivated sweet gourd

Use of agriculture input (kg/ha)	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Urea	118	198	67	105	139	32
TSP	51	66	29	47	57	21
MP		55			63	
Irrigation (Tk/ha)	1921	3359	75	2147	4568	113
Pesticide (Tk/ha)	823	1682	104	918	1612	76

b) Changes in use of Plant Protection Measures

The study investigated the plant protection measures being adopted by the farmers and compared it with the non-project farmers in the following table 4.28. Investment of farmers for insecticide and fungicide for cultivating sweet gourd has been plotted in the table and observed that the project farmers increased insecticide use by 34% and fungicide by 92%. On the other hand the control farmers increased the use of insecticide by only 15% and fungicide by 5%. The results indicated that uptake of plant protection measures among the beneficiary farmers is very high than the control

groups. Both group of farmers invested some amount of money for IPM measures. The project also promoted the poison bet in the sweet gourd field.

Table 4.28: Changes in use of plant protection measures by farmers who cultivated sweet gourd

Plant protection measures	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Insecticide (cost/ha)	847	1132	34	906	1043	15
Fungicide (cost/ha)	461	884	92	720	759	5
IPM (cost/ha)		206			309	
All (cost/ha)	1176	1870	59	1386	1752	26

c) Change of Income in Homestead Resources

The mean homestead income for project farmers in pre and post project time is observed as Tk 1000/- and Tk 2800/- respectively which is considerably higher than the non-project farmers (Tk 700/- and Tk 1950/- respectively). The project intervention increased the non-crop income of homestead for project farmers by 180% and non-project farmers by 179%, vegetable production increased by 150% and 140% respectively, fruit tree production increased by 187% and 109% respectively for project and non-project farmers.

The table 4.29 below showed the changes in homestead production (Tk/yr) by project and control farmers under project and pre-project situation.

Table 4.29: Changes in income from homestead resource by farmers who cultivated Sweet Gourd

Use of homestead resource	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Income of homestead (Tk/yr)	1000	2800	180	700	1950	179
Vegetable production (Tk/yr)	1270	3181	150	1525	3658	140
Nursery development (Tk/yr)					1000	
Plantation of fruit trees (Tk/yr)	1300	3733	187	865	1808	109

Compost production (Tk/yr)	800	1500	88		700	
All	5170	11214	117	3090	9116	195

d) **Changes in Land Asset**

Considering area of homestead and owned cropland the project farmer was comparatively poorer than the control farmers (Table 4.30). The project farmers could not change their homestead area but the control farmers changed it by 4%. Similarly the project farmers increased the area of their own cropland by 3% while the control farmers changed it by 15%. The project farmers had higher area of leased land (129 decimal per family) and increased the area by 31%. On the other hand the control farmers had minimum leased land (30 decimal per family) and increased it by 34%. In case of share cropping the area increased by 95% by project supported households while in non-supported households this change was 34%. Overall all the area changes of land asset for project farmers found as 25% against 21% for control groups.

The project supported sweet gourd farmers performed better than the non-supported households even though they were poorer. The poor households have less capacity to invest resources in land asset as it is the costliest asset in the rural area and many families compete for purchasing land. Logically the well off households won the game. This is the main reason why project intervention has not been reflected in increasing the area of cropland or homestead land.

Table 4.30: Changes in land asset of farmers who cultivated Sweet Gourd

Category of land (decimal)		Project beneficiaries			Non-project beneficiaries		
		Pre-project	Post project	% Change	Pre-project	Post project	% Change
1	Homestead	16	16	0.00	18	19	4
2	Crop land – own	156	162	3	231	265	15
3	Crop land – leased	129	169	31	30	47	36
4	Crop land - share crop	50	98	95	70	94	34
	All	89	111	25	87	106	21

4.2.7 Homestead Farmers

The project beneficiaries who received demonstrations on home gardening, saplings for fruit trees to develop orchards, and input support production program were listed and sampled from four Upazilas to determine their improvement in respect of technology uptake, family asset and financial

strength. The changes in crop production technologies of homestead farmers are discussed separately in the following sections.

a) Changes in use of Agriculture Input

The farmers who received support to improve their homestead production by cultivating vegetables and planting fruit trees are investigated separately for adoption of input use in growing vegetables. The project supported farmers increased the use of urea to their vegetable crops by 174% TSP by 273% and MP by 221%. The control farmers also increased the use of urea by 119%, TSP 156% and MP by 145%. Use of pesticide and Irrigation also increased by both groups but better performance showed by control farmers. In case of fertilizer use the uptake of input use is found very high.

Table 4.31: Changes in use of agriculture input by farmers who cultivated homestead crops

Use of agriculture input (kg/ha)	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Urea	100	274	174	91	200	119
TSP	38	143	273	43	110	156
MP	39	125	221	32	77	145
Irrigation (Tk/ha)	3225	4430	37	2695	4658	73
Pesticide (Tk/ha)	1098	2111	92	741	2867	287

b) Changes in use of Plant Protection Measures

The farmers who were under the homestead-supported groups responded similarly as other roup of farmers in respect of use of plant protection measures in their crop cultivation especially in rice cultivation. The following table summarized the use of insecticide by project and non-project farmers during pre and post project period. It has been observed that they (the project farmers) have increased their investment against insecticide by 43%, and fungicide by 81%. The project and non-project farmers have also practiced IMP measures in the rice cultivation in a limited scale. The non-project farmers have also increased their investment against insecticide by 29%, and fungicide by 78%.

The performance of project farmers found better than non-project farmers in using insecticide and fungicide. The mean change for project farmers was 62% against 54% for non-project farmers (Table 4.32).

Table 4.32: Changes in use of plant protection measures by farmers who cultivated homestead crops

Plant protection measures	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Insecticide (cost/ha)	969	1387	43	1144	1477	29
Fungicide (cost/ha)	505	912	81	516	918	78
IPM (cost/ha)		445			508	
All (cost/ha)	1352	2086	62	1331	2266	54

c) Change of income from Homestead Resource

The income from homestead resources or the homestead farmers is found comparatively higher. The mean income of homestead for project farmers in pre-project period was Tk 12025/-, which increased to Tk 19450/- (62%) after project intervention. On the other hand the income of non-project farmers was found as Tk 7183/- and Tk 9571/- at pre and post project time. The project farmers had 40% higher homestead income at pre-project and 51% higher income at post project time. Considering all components of homestead, the earnings of project beneficiaries increased by 62% and non-project farmers increased by 33%. Income from compost production showed higher for control farmers than the project farmers, which is unusual because the project provided strong support through training and saplings to the project farmers for nursery development.

Detailed of homestead income of farm families is shown in the following table 4.33.

Table 4.33: Changes in income from homestead resource by farmers who grows homestead crops

Use of homestead resource	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Income of homestead (Tk/yr)	1200	2600	117	400	700	75
Vegetable production (Tk/yr)	1270	4600	262	1128	2722	141
Nursery development (Tk/yr)	900	1300	44			
Plantation of fruit trees (Tk/yr)	1250	2520	102	571	1000	75
Compost production (Tk/yr)		433		233	767	229
All	12025	19450	62	7183	9571	33

d) Changes in Land Asset

The beneficiaries sampled under homestead farmers are found comparatively larger than the control samples. The changes in area of homestead and crop land for control farmers are found as 6% while the beneficiaries changed their cropland by 18%. The supported farmers performed better than the control farmers in respect of increasing the cropland in last few years. Significant changes occurred in changing the area of lease and sharecropping for the project beneficiaries than the control households. It is expected that these project beneficiaries (farm families) will further increase their family asset very soon utilizing the resources to be earned from crop cultivation in leased and sharecrop land.

The homestead group of beneficiaries has developed their land asset faster than the control beneficiaries because they were little bit better off households than the control samples. This indicates that resource base is one of the most vital indicator for better utilize of additional resources in purchasing land asset.

Table 4.34: Changes in land asset of farmers who cultivated homestead crops

Category of land (decimal)		Project beneficiaries			Non-project beneficiaries		
		Pre-project	Post project	% Change	Pre-project	Post project	% Change
1	Homestead	20	20	0	17	18	6
2	Crop land – own	141	167	18	95	101	6
3	Crop land - leased	160	230	49	38	42	12
4	Crop land - share crop	30	135	350	345	168	(51)
	All	118	151	28	92	114	24

4.3 Changes in Project Beneficiaries

In the above sections interpretation was made among group of farmers who cultivated a particular crop like boro rice, mustard, wheat etc. In the following section changes of household has been interpreted considering all interviewed farmers (irrespective of crop group) without segregating them by groups as per crops grown. The changes in different crop production activities and land asset of households have been measured during pre and post project situation following recall method. The changes in development indicators of project farmers have compared with non-project farmers too.

4.3.1 Use of Agriculture Input

Fertilizer, irrigation and use of pesticides are the most important inputs needed to improve the crop production and thereby better livelihoods of rural farm families. The following table showed the changes in use of major crop production inputs by the farmers of the project area.

When the use of input in crop production has been plotted it has been observed that significant changes occurred in project beneficiaries and also in non-project beneficiaries. The project farmers are using 65% higher dose of urea than the earlier time (pre-project situation), 140% higher amount of TSP and 135% higher amount of MP compared to their earlier use. They have also increased the investment against irrigation (81% higher) and pesticide use (81% higher) in crop production (Table 4.35).

If we compare the changes against the non-project farmers except application of urea, TSP and pesticide they have showed better changes than the non-project farmers. It happened as the non-project farmers were not really out of project facilities, because they got benefit of seed distribution and training. And another important consideration is that non-project farmers are comparatively better off than the project farmers so their financial capacity supported to invest more money to crop production.

Table 4.35: Changes in use of agriculture input by project beneficiaries

Use of agriculture input	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Urea (kg/ha)	149	245	65	165	257	56
TSP (kg/ha)	45	109	140	54	124	130
MP (kg/ha)	36	84	135	29	88	205
Irrigation (Tk/ha)	2255	4082	81	2193	4683	114
Pesticide (Tk/ha)	831	1934	132	862	1986	130

4.3.2 Use of Plant Protection Measures

Plant protection measures especially controlling bakanae disease was one of the most important interventions of the project and some positive results have been found in use of fungicide by project farmers. Investment has also been increased in insecticide and herbicide use in crop production mostly rice. Few farmers are also using IPM techniques in the field.

If we compare the changes occurred between two group of farmers i.e. project and non-project beneficiaries it has been observed that project farmers are slightly ahead than the non-project farmers. But the changes are not significant. It indicates the both groups received benefits of project activities.

Table 4.36: Changes in use of plant protection measures by project beneficiaries

Use of protection measures	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change
Insecticide (cost/ac)	956	1287	35	974	1274	31
Fungicide (cost/ac)	579	973	68	583	805	38
Herbicide (cost/ac)		659			823	
IPM (cost/ac)		453			420	
All	1125	1939	72	1095	1779	63

4.3.3 Income of Homestead Resources

The following table 4.37 summarized the annual income from different items of homestead areas. The project farmers made good progress in respect of improving their homestead resources than their counterpart non-project farmers. Vegetable production increased by 141%, nursery development by 319%, plantation of fruit trees by 106% and compost preparation by 50%. Irrespective of item of income the progress is found as 83% for project farmers and 70% for non-project farmers.

The non-project farmers also made significant improvement in homestead resources and in few items they have exceeded project farmers too. However the in general the performance of project farmers were found better than non-project farmers. The non-project farmers increased their vegetable production from homestead by 141%, nursery development by 119%, plantation of fruit trees by 69% and compost preparation by 70%.

The overall improvement in homestead income has greatly increased for the farmers though the changes between project and non-project farmers are not as differed as expected. It is not logical too because the level of financial base of these two groups are different better for non-project farmers.

Table 4.37: Changes in income of homestead resource by project beneficiaries

Use of homestead resource	Project beneficiaries			Non-project beneficiaries		
	Pre-project	Post project	% Change	Pre-project	Post project	% Change

Homestead (general)	2439	4466	83	1645	3318	102
Vegetable production	1300	3137	141	1273	3067	141
Nursery development	1300	5450	319	1600	3500	119
Plantation of fruit trees	1464	3012	106	1394	2363	69
Compost production	550	825	50	500	807	61
All	6926	12684	83	5301	8985	70

4.3.4 Land Asset

Land asset is the most important and vital for the villagers as their livelihoods mainly governed by the area of land they cultivate. So the study investigated the changes of land asset of farm families after project intervention. It has been observed that both groups either project or non-project farmers have improved their occupancy/control in land asset than earlier position. But in general the situation is found better with project-supported farmers than the non-project farmers (Table below).

The changes in land asset per family like area of homestead, area of owned crop land, area of leased land and area of sharecropping occurred by project intervention is plotted in the following table 4.38. The changes of this permanent asset between project beneficiaries and non-project beneficiaries are compared and found that the mean change in land asset for project farmers was 35% while for non-project beneficiaries it reached to 26%. The improvement in land asset for project farmers was 26% (35-26*100) higher than the non-project farmers. In other indicators the improvement of project farmers was not as high as in land asset because the project farmers acquired higher leased and sharecropping land after project intervention that result their better improvement.

Irrespective of crops grown by farmers i.e. without considering crop group the homestead land of project farmers increased by 3% than their pre-project occupancy, owned crop land increased by 14%, leased land (crop) by 71% and sharecropping land by 43%. On the other hand the non-project farmers increased their area of homestead land by 3%, owned cropland increased by 22%, leased land (crop) by 59% and sharecropping land by 17%.

Table 4.38: Changes in land asset of project beneficiaries

Category of land		Project beneficiaries			Non-project beneficiaries		
		Pre-project (decimal)	Post project (decimal)	% Change	Pre-project (decimal)	Post project (decimal)	% Change
1	Homestead	18	19	3	18	19	3

2	Crop land - own	185	210	14	191	233	22
3	Crop land - leased	30	137	71	73	116	59
4	Crop land - share crop	96	138	43	155	181	17
	All	169	229	35	109	137	26

4.4 Comparison between Farmers under Different Crops

The above section discussed the progress of farm families with groups made for sampling i.e. boro rice cultivated or supported ones, mustard farmers or potato farmers etc. The progresses or changes achieved by the group of farmers as they sampled are analyzed in the following section.

4.4.1 Change in Crop Area

In general the cultivated land area of project farmers were found as 195 decimal per family before project and 259 decimal after project and the improvement is 33%, which mostly contributed by the leased and sharecropping land what has been observed from the earlier discussion. Similarly the land area found for non-project farmers was 212 decimal per family before project and 294 decimal after project and the increase was 38% mostly due to share and leased land. In non-project group they had no lease or share cropping land area before in many crops like rice but after project intervention or with time they have also acquired leased or share cropping land that contributed greater change in present land area.

The following table 4.39 summarized the changes of crop area by farmers who sampled as boro rice farmers, potato farmers, mustard farmers and so on according to the support provided by the project. If we compare the progress or improvement in land asset by group of farmers by crops grown, mustard farmers greatly changed their occupancy in land asset followed by T. aman farmers, homestead group, potato, boro farmers and so on. In Jamalgonj Upazila vast area of land in several haors came under cultivation of mustard, which reflected in the area change of mustard farmers. In T. Aman the project successfully introduced some new varieties like BRRI dhan 33, BRRI dhan 44, BRRI dhan 46 after adaptive trials. The area of those varieties has been increased due to seed support programs of the project. The high increase of T. Aman rice area reflected successful extension of those varieties in the project area. While in boro rice no such variety could be introduced after several PVS trials so the area increase is found as usual and mostly similar for both

project and non-project farmers. Good success also observed in potato area, because the project introduced HYVs of the crop, though there is limitation of seed supply and high investment require from the producers still some farmers have increased the area and growing HYVs of the crop. The non-project farmers did better than the project farmers because of their better financial strength and potato is high investment crop.

Table 4.39: Changes in crop area of project beneficiaries due to project intervention

Name of crop		Project beneficiaries			Non-project beneficiaries		
		Pre-project (decimal)	Post project (decimal)	% Change	Pre-project (decimal)	Post project (decimal)	% Change
1	Boro rice	161	206	28	170	213	25
2	T. aman rice	92	136	47	102	168	65
3	Wheat	35	42	20	38	42	10
4	Potato	16	20	32	26	35	37
5	Mustard	23	55	144	38	63	69
6	Sweet gourd	15	18	20	17	21	24
7	Homestead gardening	21	35	67	19	30	58
	All	195	259	33	212	294	38

4.4.2 Change in Crop Production

Interestingly the production per unit area of all the crops under study except sweet gourd of project farmers was higher than the non-project farmers. It is not unlikely because the production per unit area of marginal or small farmers is generally found higher than the medium or better off farmers. This result also indicated that the control farmers were comparatively better off than the project farmers. The mean crop yield of project farmers before project intervention was 2.70 t/ha against 2.56 t/ha of control farmers. The mean crop yield of project farmers after project intervention is found as 4.98 t/ha against 4.56 t/ha of non-project farmers (Table 4.40). If we consider the post project yield of different crops, except potato and sweet gourd, the yields of all other crops exceeded the national average of present time. The present yield of non-project farmers also found better than the national average. It is mentioned that the rice yield stated by farmers are mostly fresh weight that generally contains 28-30% moisture but yield is generally by dry weight that

contains 12-14% moisture. So the yield presented here especially for rice would actually be almost 15% lower.

The change of yield by last couple of years (project period) is greatly increased. The mean yield increase for project farmers is found as 100% against 91% for non-project farmers. Highest yield increase has been observed from mustard in both project (166%) and non-project (125%) farmers. Yield of boro rice has increased by 86% for project farmers and 77% for control farmers, yield of T. Aman rice increased by 48% and 53% for project and non-project farmers respectively. Yield of potato not increased as of other crops the range of change was 36% to 45%, the possible reason is non-adoption of HYV as expected due to unavailability of seed in local market and the crop itself deserves high investment (seed and fertilizer cost). Improvement in crop production is highly encouraging.

Table 4.40: Changes in crop production of project beneficiaries due to project intervention

Name of crop	Project beneficiaries			Non-project beneficiaries		
	Pre-project (Kg/ha)	Post project (Kg/ha)	% Change	Pre-project (Kg/ha)	Post project (Kg/ha)	% Change
Boro rice	3390	6320	86	3310	5870	77
T. aman rice	3151	4676	48	3016	4610	53
Wheat	2033	3744	84	1781	2988	68
Potato	4859	7060	45	4550	6191	36
Mustard	576	1531	166	566	1273	125
Sweet gourd	2671	5788	117	2880	5883	104
Homestead gardening (income/yr)	2238	5717	155	1856	5070	173
All	2703	4977	100	2566	4555	91

4.4.3 Change in Seed Production

The following table 4.41 summarized the data on how much crop seeds are being kept by the rural families and what improvement has been achievement by project intervention. It has been observed that in Sunamgonj locality each of the farm families are keeping 49 kg boro seed, 39 kg T. Aman seed, 17 kg wheat seed, 9 kg potato and 8 kg mustard seeds at present, which is 41% higher than their seed storage of earlier time (before project intervention). The data support that they are keeping comparatively large quantity of mustard and wheat seed. Both mustard and wheat are focused crops of the project so cooperators stored more seeds of these crops. On the other hand the

non-project farmers are keeping 5 kg mustard seed per family, 12 kg potato seed (greater than project samples), 14 kg wheat, 49 kg T. Aman and 44 kg boro seeds. In case of potato the project farmers reduced the seed amount than the earlier time. The results indicated that the farmers were unable to keep HYV seeds of potato that they cultivated by project supports.

Table 4.41: Changes in seed production of project beneficiaries due to project intervention

Name of crop	Project beneficiaries			Non-project beneficiaries		
	Pre-project per family (kg)	Post project per family (Kg)	% Change	Pre-project per family (kg)	Post project per family (Kg)	% Change
Boro rice	40	49	21	42	44	6
T. aman rice	23	39	67	28	49	72
Wheat	7	17	141	12	14	14
Potato	11	9	(16)	11	12	9
Mustard	5	8	59	3	5	75
All	17	24	41	19	25	29

Changes in Cropping Pattern

The following table summarized the changes in cropping pattern of the project beneficiaries. The data indicated that double-cropped area for the project farmers increased by 54% (Boro followed by T. Aman) and 15% (T. Aman followed by rabi crops). Single cropped area for boro rice increased by 13% while T. Aman increased by 23%. The numbers of beneficiary for single T. Aman crop reduced by 49% while T. Aman followed by rabi crops (double-crop) increased by 170%. The numbers of beneficiary for single boro crop and boro followed by T. Aman have not been really changed. The area of single rabi crops has changed by 18% and beneficiary by 81%.

Table: Changes in cropping pattern by project intervention

Sl #	Name of Cropping pattern	Pre-project		Post-project	
		# hh	Area/hh (decimal)	# hh	Area/hh (decimal)
1	Boro-Fallow-Fallow	129	210	132 (2)	238 (13)
2	Boro-T.Aman-Fallow	127	119	129 (2)	183 (54)
3	T.Aman-Fallow-Fallow	47	83	24 (-49)	102 (23)
4	T.Aman-Rabi Crops-Fallow	20	80	54 (170)	92 (15)
5	Fallow-Rabi Crops-Fallow	59	44	107 (81)	36 (18)

Use of Fallow Land

The following table showed the use of seasonal fallow land by the project beneficiaries. Of the samples 35 said they had fallow land with an average area of 70 decimal per family. After project intervention they have used their fallow land by planting rabi crops, boro rice, and T. Aman rice. The fallow land per family of those 35 beneficiaries reduced to 25 decimal (70-45). Majority of fallow area cultivated by rabi crops (24 hh) and boro rice (7 hh). The results indicated that project intervention helps farmers to cultivate their fallow land by suitable crops. Cultivation of fallow lands also influenced by season, market price and resource base of the farmers.

Table: Changes of fallow land to cropland

Sl #	Pre-project			Post-project		
	Name of cropping pattern	# hh	Area/hh (decimal)	Name of cropping pattern	# hh	Area/hh (decimal)
1	Fallow-Fallow-Fallow	35	70	Fallow-Rabi-Fallow	24	57
				Boro-Fallow-Fallow	7	61
				T. Aman-Rabi-Fallow	2	15
				Boro-Fallow-Rabi	1	50
				T. Aman-Fallow-Fallow	1	45
All		35	70		35	45

Change in Crop variety

None of the farmers were using HYVs in wheat, potato, mustard, and sweet gourd before project but the scenario has been greatly changed after project intervention. It is observed that 13% of farmers are using HYV in wheat, 12% HYV potato, 10% HYV mustard, and 17% using HYVs in sweet gourd. The use of HYVs in boro rice has also been changed from 20% to 73% and in T. Aman 27% to 49%.

Table: Change in use of crop variety by project beneficiary

Sl #	Crop	Pre-project		Post-project	
		Local	HYV	Local	HYV

		# hh	%	# hh	%	# hh	%	# hh	%
1	Boro rice	207	58	72	20	12	3	264	73
2	T. aman rice	88	24	98	27	36	10	178	49
3	Wheat	22	6	0	0	10	3	46	13
4	Potato	19	5	1	0	22	6	43	12
5	Mustard	11	3	0	0	7	2	35	10
6	Sweet gourd	16	4	0	0	32	9	60	17
7	Homestead gardening	10	3	0	0	38	11	10	3

4.5 Results of FGD

By and large 60% participants of FGD were project farmers and 40% non-project farmers. The area of owned land of participants mostly ranged from 40-340 decimal and leased lands ranged from 50-250 decimal. Details information against development indicators of farmers present in the FGD session are shown in the **Annex IV**. The annex showed information of 8 FGD sessions conducted in 4 Upazilas (two in each Upazila). Based on the responses collected from 20 participants of FGD sessions, the changes in crop area, productions per unit area and family income across Upazilas are shown in the **Annex III**. Based on FGD sessions the interpretation is made in the following section.

4.5.1 Change in Crop Area

The following table summarized the mean of owned crop area of participants attended in 8 FGD sessions conducted in four Upazilas (two in each Upazila). The present area of boro rice cultivation by each of the farm families is observed as 106 decimal compared to 51 decimal cultivated earlier. The change in boro rice is reached to 52%. As found in household survey the highest change in crop area in mustard (83%), followed by wheat (60%), sweet potato (58%), T. Aman rice (57), and potato (49%).

The present cultivated area per family found under sweet potato (19 decimal), potato (18 decimal), and mustard (58 decimal) by FGD sessions are very similar to that of showed by household survey (Table 4.42). Actually farmers used their leased in land mostly for rice cultivation, so the area of rice land documented in FGD is less than the area of rice land found in household survey. FGD was done to validate or support the observation of important indicators.

Table 4.42: Change in crop area of household in project area

Sl #	Name of crop	Present crop area (decimal)	Earlier crop area (decimal)	% Change
1	Boro rice	106	51	52
2	T. aman rice	51	22	57
3	Wheat	5	2	60
4	Potato	18	9	49
5	Mustard	58	10	83
7	Sweet gourd	19	8	58

4.5.2 Change in Crop Production

The present crop yield per ha found from the FGD sessions is summarized in the following table 4.43 and it has been observed that except potato the yield of different crop supported by the project are more or less similar. There is little variation in present yield produced by boro rice by two measurements – FGD showed 5.42 t/ha and household survey 6.32 t/ha with variation of 14%. But interestingly the yields of T. Aman, wheat, mustard drag out by two systems of investigation almost coincided. The yield of sweet gourd found is also found higher in FGD than the household survey.

Irrespective of project and non-project beneficiaries the present yields of different crops as observed under FGD sessions are: boro rice 5.42 t/ha, T. Aman 4.55 t/ha, wheat 3.44 t/ha, potato 28.34 t/ha (much higher than the national average yield), mustard 1.53 t/ha and sweet gourd 11.15 t/ha.

Table 4.43: Change in crop production of household in project area

Sl #	Name of crop	Present crop yield (t/ha)	Earlier crop yield (t/ha)	% Change
1	Boro rice	5.42	3.35	38
2	T. aman rice	4.55	2.93	36
3	Wheat	3.44	1.78	48
4	Potato	28.34	14.70	48
5	Mustard	1.53	0.73	52
7	Sweet gourd	11.15	5.17	54

4.5.3 Change in Family Income

The FGD sessions investigated the average family income of marginal and small farm families who were the clientele of the project at present. The family income showed in the following table 4.44 is

the averaged of both project (60%) and non-project farmers (40%). The participants were separated as marginal and small farm families and assess their income as per farm size. The data in the following table indicated that the average family income of small and marginal farmers varied by 44% and logically higher with small farm families. The average income of marginal farmers across project area is found as Tk 26,750/- while the income of small farm families is Tk 48,125/-.

The highest income of the small farm families observed from Sadar Upazila (Tk 52,500/-) followed by Jamalgonj (Tk 49,000/-), Biswamberpur (Tk 47,000/-) and South Sunamgonj (Tk 44,000/-). The highest income of the marginal farm families also observed from Sadar Upazila (Tk 28,500/-) followed by Biswanberpur (Tk 28,000/-), Jamalgonj (Tk 26,500/-) and South Sunamgonj (Tk 24,000/-).

Table 4.44: Family income of household

Sl #	Upazila	Family income (Tk)		Difference (%)
		Small farm	Marginal farm	
1	B. Pur	47000	28000	40
2	S. Sunamgonj	44000	24000	45
3	Jamalgonj	49000	26500	46
4	Sadar	52500	28500	46
Mean		48125	26750	44

Mean values estimated in two FGDs of 20 farmers in each Upazila

Analysis and Conclusion

The present study was conducted with comparatively large volume of representative samples including non-supported farm families. After collecting the primary information the interpretation of results is made separately as per samples growing crops like boro rice, T. Aman rice, wheat, mustard, potato etc. The performances of farm families in respect of their increase of crop area, crop production, seed storage, use of crop varieties, use of cropping patterns etc. is compared following recall methods.

In general the performance of beneficiaries against the selected development indicators showed good progress but did not always exceeded the performance (especially in crop area) of non-supported farmers as expected. The reason is carefully verified in the field and found that the non-supported farm households are comparatively larger farmers than the supported groups. The project formed the CO (Credit Group) with poorer households of the village so non-CO households from where control samples selected are comparatively better off. Still the supported farmers did well in majority of important development indicators like change of land asset, income from homestead, crop production per unit area, use of own seed etc. than the control farmers.

The study observed that:

- The farmers of the district have not accepted the boro rice variety (BR 27 and 45) selected by PVS (Participatory Variety Selection) trial conducted by BRRI
- Farmers are more interested to grow variety with high yield potential (BR 29) in boro season even though it is long duration
- None of the respondents is using any cold tolerance variety in boro season. Actually the project could not yet introduce any cold tolerance rice variety in boro season, more works are to be done for selecting such variety (s)

- The project successfully introduced certain good modern varieties like BRRI dhan 33, BRRI dhan 44 and BRRI dhan 46 in T. Aman (kharif II) season
- Good innovation is found in extension of mustard crop in fallow land of haors, the farmers are using modern varieties like BARI sharisha 9, 11 and 14 and harvesting very good yield (1.5 to 1.7 t/ha)
- Farmers are getting reasonably good yield (3.00 to 4.00 t/ha) in wheat but the cultivated area per household is still poor (42 decimal)
- The cultivated area of potato per household is found as 20 decimal
- Sweet gourd is a low cost crop but the area coverage per household of project farmers is still poor (18 decimal)
- The production per unit area of different crops under study is reasonably good and better with project farmers
- The data of different development indicators like crop yield, area coverage etc revealed from household survey and FGD as well were close to each other
- The family income for marginal farmers (Tk 26750/-) is found still poor compare to the income showed in other locations (more than 30 thousands), similarly the income of small farmers is observed as Tk 48125/-, which should be more than Tk 50,000/-

Scope of further improvement:

- The project is to select cold tolerance variety for boro season, so adaptive research trials especially in rabi season to be continued
- More pilot production programs is to be continued to extend the area of T. Aman with BRRI dhan 33 so that farmers can plant rabi crops (mustard potato, wheat) after harvest of T. Aman to increase cropping intensity
- Extension works are to be continued to control bakanae disease in boro and T. Aman rice
- Fallow land per household is found as 70 decimal, though use of fallow land has been increased but still there is room for further improvement. Crops like mustard, sweet gourd, peanut should be promoted to cultivate in possible area. The project should continue the efforts and seed support to cultivate fallow land
- The study revealed good success in extension of rabi crops after T. Aman rice, so promotion of rabi crops after receding seasonal flood water should be continued
- The project need to focus in reducing irrigation water in boro rice that would need to use porous pipe to measure irrigation water

- To reduce urea application in boro rice the project could set demonstration with USG. For the purpose USG planter could be purchased from suitable supplier
- Technology demonstration using sex pheromone is to be done in locations where farmers are popularly growing vegetables especially brinzal and cucurbits
-

Annexes

Annex I

Terms of Reference

Impact study of agricultural activities: ***productivity, production, income, consumption and sustainability***

1. Introduction

Community Based Resource Management Project (CBRMP) has been operating its activities since early 2003 in Sunamganj with an aim at reducing poverty of the poor through an integrated approach combining five components where agriculture and livestock production development is a major one. The component is being implemented with assistance of a few national research institutions and local extension departments under close supervision of Project's Agriculture Consultant along with a few specialized regular staffs. The objectives of the component are to address the problems in local agriculture, introduce improved varieties of crops and assist the farmers to increase production through better crop and farm management in sustainable manners.

Meanwhile the project has introduced many crops through participatory variety selection including early variety Boro rice, improved T Aman and other winter/summer crops for cultivating after T Aman considering feasibilities and demand of farmers.

After working around 6 years, now the time has reached appraise the results of the technologies provided by the project to farmers and thereby to develop an uptake plan for extension of feasible technologies and crop varieties.

2. Specific Objectives

This study is the downstream of previous inputs towards improving crop and farm management. The objective of the study will be to assess the impact of the crop technologies that have been

introduced in SCBRMP, in terms of productivity, production, income, consumption and sustainability of the crops. All selections will be subject to proven records of positive impact.

The specific crop introduction sub-programmes to be covered by the study will be:

- Giving selection of early variety Boro rice with further instruction to efficient management
- Giving selection of improved variety T Aman with further instruction to efficient management
- Giving selection of winter/summer crops for fallow land cultivating after T Aman with further instruction to efficient management
- Giving selections of fodders with further instruction to efficient management

3. Scope and Methodologies

The study will be carried out in four Upazilas where the project has been working since inception and introduced maximum numbers of crops. All crops introduced will have to be brought under study. The production will be judged against national data along with data from control framers without project support who practiced similar varieties of crops in the same seasons as the supported farmers.

Sample will be drawn on random basis following the standard rules considering each Upazila a single unit.

For data collection a semi-structured interview format may be used including FGD to focus on specific issues and to draw popular consensus. For each crop at least one FGD will have to be conducted in one Upazila.

The study results will be discussed in a workshop and that will be incorporated in the final report.

4. Deliverables

The consultant will design and process the study. He or she will prepare a detail report showing the efficiency and sustainability of the crops yield along with the process of management and future project inputs/support plan.

The specific tasks to be delivered:

- The consultant will design the study
- Prepare a plan and timing of the study
- Form the survey team
- Plan the field work
- Train the enumerator
- Prepare the format of semi-structure interview
- Develop the checklist for the FGD
- Mobilize and review the secondary documents
- Analyze the data
- Report writing

5. Transfer of knowledge: Training

Staffs/others involved in survey will be trained by the consultant with assistance of Associate.

6. Reporting

1)	Inception report:	Within 15 days after contract signing
2)	1st draft of the final report:	Within 30 days after Inception report
3)	Final draft of the final report:	Within 15 days after getting comments on 1st draft of the final report
4)	Final report:	Within 7 days after getting comments on final draft of the final report

7. Facilities provided by the project and other institutional arrangement

Project will provide necessary staff for interviewing and mobilizing farmers and conducting FGD. The concern Upazila will provide the staff for interviewing and conducting FGD. The interview data will be checked and verified by the SMS agriculture and SMS socio-economic. Further they will prepare the FGD report of the Upazila as well. All data will be complied and registered by research Associate

under the instruction of the consultant. The data will be analyzed by the consultant with assistance of Associate.

8. Contract, Budget and Timeframe

The consultant will be procured following Single Source Method in continuity of disseminating improved crop and farm management. The study will be financed based on lump sum budget and maximum period of study will be 75 days.

Annex II

Sample ID #				

Community Based Resource Management Project
Assessment on Changes in Crop Production

Questionnaire

A: Identification

Upazila _____ Union _____ Village _____

Group name _____

Farmer's name _____ Father/Husband name _____

Age _____ Sex M/F Education

Family size _____ Social Status: Married/unmarried. Religion _____

Occupation

A1. Project Agricultural Programme Support Status

A1.1 Farmer received support YES/NO

If A1.1 = YES, go to A1.2. If A1.1 = NO, go to A1.3

A1.2 Crop supported (tick one):

Sl #	Name of crop
1	Boro rice
2	T. aman rice
3	Wheat
4	Potato
5	Mustard
6	Sweet gourd
7	Mungbean

A1.3 Farmer got information from any supported farmer? YES/NO
(includes viewing demonstration plot)

A1.2 IF YES, crop concerned (tick one):

Sl #	Name of crop
1	Boro rice
2	T. aman rice
3	Wheat
4	Potato
5	Mustard
6	Sweet gourd
7	Mungbean

Sample ID #				

B: Land Assets

	Land used/area by farmer (decimal)	
	Pre-project	At present
Homestead		
Crop land – owned		
Crop land – leased		
Crop land - share crop		

C: Change in Crop Area

Sl #	Name of crop	Pre-project (decimal)	At present (decimal)
1	Boro rice		
2	T. aman rice		
3	Wheat		
4	Potato		
5	Mustard		
6	Sweet gourd		
7	Mungbean		
8	Country bean		

D: Change in Crop Production

Sl #	Name of crop	Pre-project (Kg/ha)	At present (Kg/ha)
1	Boro rice		
2	T. aman rice		
3	Wheat		
4	Potato		
5	Mustard		
6	Sweet gourd		
7	Mungbean		
8	Country bean		

E: Seed Production

Sl #	Name of crop	Pre-project per family (kg)	At present per family (Kg)
1	Boro rice		
2	T. aman rice		
3	Wheat		
4	Potato		
5	Mustard		
6	Sweet gourd		
7	Mungbean		
8	Country bean		

Sample ID #				

F: Change in crop variety

Sl #	Name of crop	Pre-project (Varieties used)	At present (Varieties using)
1	Boro rice		
2	T. aman rice		
3	Wheat		
4	Potato		
5	Mustard		
6	Sweet gourd		
7	Mungbean		
8	Country bean		

Crop not grown = 0; 1 = Local variety; 2 = Improved variety

G: Change in crop technology

Sl #	Name of crop	Pre-project (Technology used)	At present (Technology using)
1	Boro rice		
2	T. aman rice		
3	Wheat		
4	Potato		
5	Mustard		
6	Sweet gourd		
7	Mungbean		
8	Country bean		

0= No technology used; 1 = Improved fertilization; 2 = Irrigation; 3 = Pesticide; 4 = New crop; 5 = Line sowing; 6 = New variety; 7 = Others (specify)

H: Change in cropping pattern

Sl #	Pre-project		At present (Cropping pattern using)	
1	Name of Cropping pattern	Area (decimal)	Name of cropping pattern	Area (Decimal)
2	Boro – Fallow – Fallow			
3	Boro – T. Aman – Fallow			
4	T. Aman – Fallow – Fallow			
5	T. aman – Rabi crops – Fallow			
6	Fallow – Fallow – Fallow			
7	Others			
8				

Sample ID #				

I: Changes in use of agriculture input

Sl #	Use of input	Pre-project (Tk spent during a cropping year)	Unit	Price Tk/unit	At present (Tk spent during a cropping year)	Unit	Price Tk/unit
1	Urea						
2	TSP						
3	MP						
4	Irrigation						
5	Pesticide						
6	Others						
7							
8							
9							
10							

J: Plant protection measures

Sl #	Use of protection measures	Pre-project (#)	Cost /30 decimal (Tk)	At present (#)	Cost /30 decimal (Tk)
1	Insecticide (frequency/crop)				
2	Fungicide (frequency/crop)				
3	Herbicide (frequency/crop)				
4	Integrated Pest Management (IPM)				
5	Others (Specify)				

K: Use of Homestead land

	Item of use	Pre-project			Post Project		
1	Area of homestead (decimal)	Area	Consumption (kg)	Income (Tk)	Area	Consumption (kg)	Income (Tk)
2	Vegetable production (kg/year)						
3	Nursery development						
4	Plantation of fruit trees						
5	Compost production						
6	Others (specify)						

Annex III

Table: Crop area of households at Biswamberpur

Sl #	Name of crop	Present crop area (decimal)	Earlier crop area (decimal)	% Change
1	Boro rice	100	50	50
2	T. aman rice	55	40	27
3	Wheat	10	4	60
4	Potato	5	2	60
5	Mustard	0	0	0
6	Sweet gourd	12	5	58

Mean values estimated in two FGDs of 20 farmers

Table: Crop area of households at South Sunamgonj

Sl #	Name of crop	Present crop area (decimal)	Earlier crop area (decimal)	% Change
1	Boro rice	155	125	19
2	T. aman rice	37.5	25	33
3	Wheat			
4	Potato			
5	Mustard	0	0	
6	Sweet gourd	14.5	6	59

Mean values estimated in two FGDs of 20 farmers

Table: Crop area of households at Jamalgonj

Sl #	Name of crop	Present crop area (decimal)	Earlier crop area (decimal)	% Change
1	Boro rice	170	30	82
2	T. aman rice			
3	Wheat			
4	Potato			
5	Mustard	85	10	88
6	Sweet gourd			

Mean values estimated in two FGDs of 20 farmers

Table: Crop area of households at Sadar

Sl #	Name of crop	Present crop area (decimal)	Earlier crop area (decimal)	% Change
1	Boro rice	110	64	42
2	T. aman rice	60	34	43
3	Wheat	20	10	50
4	Potato	30	16	47
5	Mustard	30	10	67
6	Sweet gourd	30	13	57

Mean values estimated in two FGDs of 20 farmers

Table: Crop yield of households at Biswamberpur

Sl #	Name of crop	Present crop yield	Earlier crop yield	% Change

		(t/ha)	(t/ha)	
1	Boro rice	5.88	3.39	42
2	T. aman rice	4.71	2.52	46
3	Wheat	3.12	1.31	58
4	Potato	26.34	13.20	50
5	Mustard	0.00	0.00	0
6	Sweet gourd	10.35	4.50	57

Mean values estimated in two FGDs of 20 farmers

Table: Crop yield of households at South Sunamgonj

Sl #	Name of crop	Present crop yield (t/ha)	Earlier crop yield (t/ha)	% Change
1	Boro rice	5.70	3.88	32
2	T. aman rice	4.65	3.35	28
3	Wheat			
4	Potato			
5	Mustard	1.60	1.10	31
6	Sweet gourd	12.75	6.50	49

Mean values estimated in two FGDs of 20 farmers

Table: Crop yield of households at South Jamalgonj

Sl #	Name of crop	Present crop yield (t/ha)	Earlier crop yield (t/ha)	% Change
1	Boro rice	4.61	2.10	54
2	T. aman rice			
3	Wheat			
4	Potato			
5	Mustard	1.50	1.10	27
6	Sweet gourd			

Mean values estimated in two FGDs of 20 farmers

Table: Crop yield of households at Sadar

Sl #	Name of crop	Present crop yield (t/ha)	Earlier crop yield (t/ha)	% Change
1	Boro rice	5.50	4.03	27
2	T. aman rice	4.30	2.93	32
3	Wheat	3.75	2.25	40
4	Potato	30.34	16.2	47
5	Mustard	1.50	0.00	100
6	Sweet gourd	10.35	4.50	57

Mean values estimated in two FGDs of 20 farmers

Information on FGDs

Annex IV

Check List for FGD (group of 20 persons)

Range of age

Male female ratio

Land asset: own and leased in cultivation (range)

Numbers of supported and non-supported farmers in the group

What support they have received: Res plot, demo or seed support

Major crops growing by the farmers (list only 8 those listed in questionnaire)

Average area of those crops at present and five years back

If increase why: List 3-5 uses

Average yield level of those 8 crops at present and five years back

If increase why list 3-5 cause

Fertilizer use increased of not (estimate %)

Irrigated area increased or not (estimate %)

What new varieties they are cultivating now

How they have known about those varieties

Source of seeds (collecting from office or own seed)

Due to CBRMP activities what benefit they have directly received: List 3-5

Are farmers found better off than earlier years like five years back

If answer is yes why: List 3-5 answers

Estimate average family income of small farmer and marginal farmer at present

Is it higher than five years back?

If yes List the causes or factors (3 to 5)

Name of the Village : Chatarkona
Name of Union : Dhanpur
Name of Upazilla :B.Pur

Range of age: (22-52 Years)
Male female ratio: (7: 3)
Land asset: own and leased in cultivation (range) Own: 30 decimal – 300; Decimal, Leased 60 decimal -150 decimal
Numbers of supported and non-supported farmers in the group (Supported 15, Non supported 5)
What support they have received: Res plot, demo or seed support (research: 3, Demo: 2, Seed support: 11
Major crops growing by the farmers (list those listed in questionnaire):Boro rice, T. aman rice, Wheat, Potato, Mustard, Mungbean

Table: B. Pur: Average area of those crops at present and five years back

Sl. No	Crop Name	Average area of those crops at present (decimal)	Average area of those crops five years back (decimal)	Comments
1	Boro rice	150	90	Irrigation increase
2	T. aman rice	60	50	
3	Wheat	10	4	
4	Potato	5	2	Cultivate local variety at homestead
5	Mustard	0	0	Cultivated by seed support but discontinued after withdrawing support
6	Mungbean	4	4	Though they got Mungbean seed but at present they practice black gram
All				

If increase why: List 3-5 causes: Introducing ground water Irrigation; Use fallow land; Use more homestead area
Average yield level of those 8 crops at present and five years back

Sl #	Crop Name	Average yield of crop at present (Ton/ha)	Average yield of crop at five years back (Ton/hac)	Comments
1	Boro rice	6.26	4.29	Flood free area
2	T. aman rice	5.12	2.88	
3	Wheat	3.12	1.31	
4	Potato	26.34	13.2	
5	Mustard	-	-	
6	Mungbean	1.31	1.31	

If increase why list 3-5 cause: Seed Quality good; Crop Rotation/ Variety rotation; Use Organic Fertilizer; Use Balance fertilizer; Develop cultural management

Fertilizer use increased of not (estimate %): Increased 500 %
Irrigated area increased or not (estimate %): Increased 80%
What new varieties they are cultivating now: BRRI dhan 28,29, 19, 40,41.44,46, Boro line, Satapdi, Diamont, Kardinal etc
How they have known about those varieties: From CBRMP office
Source of seeds (collecting from office or own seed): Sometimes collection from office, sometimes they supply themselves
Due to CBRMP activities what benefit they have directly received: List 3-5
Training; Seed; Participatory variety selection; Advise in field
Are farmers found better off than earlier years like five years back: Yes
If answer is yes why: List 3-5 answers:

- Better production
- Fallow land utilization
- Improve Cultivation
- Technology
- Seed preservation properly

Table: Estimate average family income of small farmer and marginal farmer at present

average family income of small farmer(per year)	average family income marginal farmer(per year)	Comments
46000.00	24000.00	

Is it higher than five years back? Yes
If yes List the causes or factors (3 to 5):

- More Crop production by using modern technology and seed
- Use Fallow land
- Change Cropping Pattern
- Increasing Cropping Intensity
- Raise the price of crops
- Improve communication

Name of the Village : Shaktiarkhola
Name of Union : South Badaghatr
Name of Upazilla :B.Pur

Range of age: (22-57 Years)
Male female ratio: (1: 1)
Land asset: own and leased in cultivation (range) Own: 40 - 600 decimal, Leased 30 decimal -250 decimal)
Numbers of supported and non-supported farmers in the group (Supported 11, Non supported 9)
What support they have received: Res plot, demo or seed support: research: 0, Demo: 1, Seed support 10
Major crops growing by the farmers (list only 8 those listed in questionnaire): Boro rice, T. aman rice, Sweet gourd)

Average area of those crops at present and five years back

Sl. No	Crop Name	Average area of those crops at present (decimal)	Average area of those crops five years back (decimal)	Comments
1	Boro rice	250	110	Irrigation increase
2	T. aman rice	50	30	
3	Sweet gourd	12	5	

If increase why: List 3-5 causes:
1. Introducing ground water Irrigation
2. Use fallow land especially sandy soil
3. Take seed support

Average yield level of those 8 crops at present and five years back

Sl. No	Crop Name	Average yield of crop at present (Ton/ha)	Average yield of crop at five years back (Ton/ha)	Comments
1	Boro rice	5.50	3.90	Flood affected Zone
2	T. aman rice	4.29	3.15	
3	Sweet gourd	10.35	4.5	

If increase why list 3-5 causes:

1 Seed Quality good
2 Crop Rotation/Variety rotation
3 Use Organic Fertilizers
4 Use Balance fertilizers
5 Develop cultural management

Fertilizer use increased of not (estimate %): Increased 300 %
Irrigated area increased or not (estimate %): Increased 60%
What new varieties they are cultivating now: BRRI dhan 28,29,9,40,41,hybrid (rice and Sweet gourd) etc.
How they have known about those varieties: From CBRMP office, DAE
Source of seeds (collecting from office or own seed): Sometimes collection from office or shop, sometimes they supply themselves
Due to CBRMP activities what benefit they have directly received: List 3-5

1. Training
2. Seed
3. Advise in field

Are farmers found better off than earlier years like five years back: Yes
If answer is yes why: List 3-5 answers

1. Better production
2. More Fallow land utilization
3. Improve Cultivation Technology
4. Seed preservation properly

Estimate average family income of small farmer and marginal farmer at present

average family income of small farmer(per year)	average family income marginal farmer(per year)	Comments
48000.00	32000.00	

Is it higher than five years back?: Yes
If yes List the causes or factors (3 to 5)

More Crop production by using modern technology and seed
Use more Fallow land
Change Cropping Pattern
Incising Cropping Intensity
Raise the price of crops
Improve communication

Name of the Village : Joykalosh
Name of Union : Joykolosh
Name of Upazilla :South sunamgonj

Range of age: (20-62 Years)
Male female ratio: (4:1)
Land asset: own and leased in cultivation (range): Own: 20 -350 Decimal, Leased 60 -350 decimal
Numbers of supported and non-supported farmers in the group (Supported 9, Non supported 8)
What support they have received: Res plot, demo or seed support (research:1, Demo-1, Seed support 7).
Major crops growing by the farmers (list only 8 those listed in questionnaire): Boro rice, T. aman rice, Sweet gourd, Country bean in homestead

Average area of those crops at present and five years back

Sl. No	Crop Name	Average area of those crops at present (decimal)	Average area of those crops five years back (decimal)	Comments
1	Boro rice	150	130	Irrigation increase
2	T. aman rice	40	30	
3	Sweet gourd,	13.5	6.5	
4	Country bean in homestead	4	1	

If increase why: List 3-5 causes

1. Increased surface water Irrigation
2. Use more fallow land
3. Use more homestead area

Average yield level of those 8 crops at present and five years back

Sl. No	Crop Name	Average yield of crop at present (Ton/ha)	Average yield of crop at five years back (Ton/ha)	Comments
1	Boro rice	5.6	3.90	Flood free area
2	T. aman rice	4.5	3.4	
3	Sweet gourd	13.5	6.5	
4	Country bean in homestead	9.5	7.00	

If increase why list 3-5 cause: Seed Quality good; Crop Rotation/ Variety rotation; Use Organic Fertilizer; Use Balance fertilizer; Develop cultural management

Fertilizer use increased of not (estimate %): Increased by 300%
Irrigated area increased or not (estimate%): Increased by 40%
What new varieties they are cultivating now: BRRI dhan 28,29,19,40,41, 44, 46, Hybrid (Rice and sweet gourd) BARI shim1, 4 etc
How they have known about those varieties: From CBRMP office
Source of seeds (collecting from office or own seed): Sometimes collection from office, sometimes they supply themselves
Due to CBRMP activities what benefit they have directly received: List 3-5

1. Training
2. Seed
3. Fertilizer in research
4. Pesticide (sometimes)
5. Participatory variety selection
6. Advise in field like IPM and others

Are farmers found better off than earlier years like five years back? Yes
If answer is yes why: List 3-5 answers

1. Better production
2. More Fallow land utilization
3. Improve Cultivation Technology
4. Seed preservation properly

Estimate average family income of small farmer and marginal farmer at present

average family income of small farmer(per year)	average family income marginal farmer(per year)	Comments
46000.00	24000.00	

Is it higher than five years back? Yes
If yes List the causes or factors (3 to 5)

- Consumption home made vegetables
- More Crop production by using modern technology and seed
- Use Fallow land
- Change Cropping Pattern
- Incising Cropping Intensity
- Raise the price of crops

Name of the Village : Sultanpur
Name of Union : joykolos
Name of Upazilla :South sunamgonj

Range of age: (20- 60 Years)
Male female ratio: (2: 3)
Land asset: own and leased in cultivation (range): Own: 25 - 280 decimal, Leased 40-175 decimal)
Numbers of supported and non-supported farmers in the group (Supported 11, Non supported 8)
What support they have received: Res plot, demo or seed support (research:1, Demo-2, Seed support 8
Major crops growing by the farmers (list only 8 those listed in questionnaire): Boro rice, T. aman rice, Sweet gourd, Country bean in homestead, Black gram

Average area of those crops at present and five years back

Sl. No	Crop Name	Average area of those crops at present (decimal)	Average area of those crops five years back (decimal)	Comments
1	Boro rice	160	120	
2	T. aman rice	35	20	
3	Sweet gourd,	15	5	
4	Country bean in homestead	5	1	
5	Black gram	20	5	

If increase why: List 3-5 causes

1. Increased surface water Irrigation
2. Use more fallow land
3. Use more homestead area
4. Getting seed support

Average yield level of those 8 crops at present and five years back

Sl. No	Crop Name	Average yield of crop at present (Ton/ha)	Average yield of crop at five years back (Ton/ha)	Comments
1	Boro rice	5.8	3.85	Flood free area
2	T. aman rice	4.8	3.3	
3	Sweet gourd,	12.0	6.5	
4	Country bean in homestead	10.0	7.00	
5	Black gram	1	.65	

If increase why list 3-5 cause: Seed Quality good; Crop Rotation/ Variety rotation; Use Organic Fertilizer; Use Balance fertilizer; Develop cultural management
Fertilizer use increased of not (estimate %): Increased by160%
Irrigated area increased or not (estimate%): Increased by 60%
What new varieties they are cultivating now: BRRI dhan 28,29,19,40,41,46, Hybrid (Rice) BARI shim 1,4 etc.
How they have known about those varieties: From CBRMP office,DAE
Source of seeds (collecting from office or own seed): Sometimes collection from office, BADC, sometimes they supply themselves
Due to CBRMP activities what benefit they have directly received: List 3-5

1. Training
2. Seed
3. Fertilizer in research
4. Pesticide (sometimes)
5. Participatory variety selection
6. Advise in field like IPM and others

Are farmers found better off than earlier years like five years back: Yes
If answer is yes why: List 3-5 answers

1. Better production
2. More Fallow land utilization
3. Improve Cultivation Technology
4. Seed preservation properly

Estimate average family income of small farmer and marginal farmer at present

average family income of small farmer(per year)	average family income marginal farmer(per year)	Comments
42000.00	24000.00	

Is it higher than five years back? Yes
If yes List the causes or factors (3 to 5)
Consumption home made vegetables

- More Crop production by using modern technology and seed
- Use Fallow land
- Change Cropping Pattern
- Incising Cropping Intensity
- Raise the price of crops

Name of the Village : Lambabak
Name of Union : Sadar
Name of Upazilla : Jamalgonj

Range of age: (20-65Years)
Male female ratio: (2: 5)
Land asset: own and leased in cultivation (range): Own: 40 - 450 decimal, Leased 60 -150 decimal
Numbers of supported and non-supported farmers in the group (Supported 12, Non supported 9)
What support they have received: Res plot, demo or seed support (research:1, Demo 2, Seed support 9
Major crops growing by the farmers (list only 8 those listed in questionnaire): Boro rice, Mustard, Black gram

Average area of those crops at present and five years back

Sl. No	Crop Name	Average area of those crops at present (decimal)	Average area of those crops five years back (decimal)	Comments
1	Boro rice	190	130	Irrigation increase, Production increase
2	Mustard	90	10	
3	Black gram	20	0	

If increase why: List 3-5 causes

1. Increased area of surface water Irrigation
2. Use more fallow land

Average yield level of those 8 crops at present and five years back

Sl. No	Crop Name	Average yield of crop at present (Ton/ha)	Average yield of crop at five years back (Ton/ha)	Comments
1	Boro rice	5.6	3.20	
2	Mustard	1.6	1.10	
3	Black gram	1		

If increase why list 3-5 causes:

1. Seed Quality good
2. Crop Rotation/ Variety rotation
3. Use Organic Fertilizer
4. Use Balance fertilizer
5. Develop cultural management
6. Used pesticide and vitamin

Fertilizer use increased of not (estimate %): Increased by 50%
Irrigated area increased or not (estimate%): Increased by100%
What new varieties they are cultivating now: BRRI dhan 28, 29, 19, 40, 41, Hybrid (Rice), Boro line, BARI 9,11 (Mustard) etc
How they have known about those varieties: From CBRMP office, DAE
Source of seeds (collecting from office or own seed): Sometimes collection from office, Shop, BADC, sometimes they supply themselves
Due to CBRMP activities what benefit they have directly received: List 3-5:

1. Training
2. Seed
3. Fertilizer in research
4. Pesticide (sometimes)
5. Participatory variety selection
6. Advise in field like IPM and others

Are farmers found better off than earlier years like five years back: Yes
If answer is yes why: List 3-5 answers

1. Better production
2. More Fallow land utilization
3. Improve Cultivation Technology
4. Seed preservation properly

Estimate average family income of small farmer and marginal farmer at present

average family income of small farmer(per year)	average family income marginal farmer(per year)	Comments
50000.00	28000.00	

Is it higher than five years back?: Yes
If yes List the causes or factors (3 to 5):

- Consumption home made vegetables
- More Crop production by using modern technology and seed
- Use Fallow land
- Change Cropping Pattern
- Incising Cropping Intensity
- Raise the price of crops

Name of the Village : Kamlabaj
Name of Union : Sadar
Name of Upazilla : Jamalgonj

Range of age: (19-55Years)
Male female ratio: (1: 3)
Land asset: own and leased in cultivation (range): Own: 40 - 350 decimal, Leased 50 - 260 decimal
Numbers of supported and non-supported farmers in the group (Supported 13, Non supported 8)
What support they have received: Res plot, demo or seed support (research:1, Demo-2, Seed support10
Major crops growing by the farmers (list only 8 those listed in questionnaire): Boro rice, Mustard

Average area of those crops at present and five years back

Sl. No	Crop Name	Average area of those crops at present (decimal)	Average area of those crops five years back (Decimal)	Comments
1	Boro rice	250	130	Irrigation increase, Production increase
2	Mustard	80	10	

If increase why: List 3-5 causes:

1. Increased area of surface water Irrigation
2. Use more fallow land
3.Change cropping pattern and increased cropping intensity

Average yield level of those 8 crops at present and five years back

Sl. No	Crop Name	Average yield of crop at present (Ton/ha)	Average yield of crop at five years back (Ton/ha)	Comments
1	Boro rice	4.5	3.0	
2	Mustard	1.4		

If increase why list 3-5 cause

1. Seed Quality good
2. Crop Rotation/ Variety rotation
3. Use Organic Fertilizer
4. Use Balance fertilizer
5. Develop cultural management
6. Used pesticide and vitamin

Fertilizer use increased of not (estimate %): Increased by150%
Irrigated area increased or not (estimate %): Increased by 40%
What new varieties they are cultivating now: BRRI dhan 28, 29, 19, 40, 41, Hybrid (Rice), Boro line, BARI 9,11 (Mustard) etc
How they have known about those varieties: From CBRMP office, DAE
Source of seeds (collecting from office or own seed): Sometimes collection from office, Shop, BADC, sometimes they supply themselves
Due to CBRMP activities what benefit they have directly received: List 3-5

1. Training
2. Seed
3. Fertilizer in research
4. Pesticide (sometimes)
5. Participatory variety selection
6. Advise in field like IPM and others

Are farmers found better off than earlier years like five years back: Yes
If answer is yes why: List 3-5 answers

1. Better production
2. More Fallow land utilization
3. Improve Cultivation Technology
4. Seed preservation properly

Estimate average family income of small farmer and marginal farmer at present

average family income of small farmer(per year)	average family income marginal farmer(per year)	Comments
48000.00	25000.00	

Is it higher than five years back?: Yes
If yes List the causes or factors (3 to 5)

- Consumption home made vegetables
- More Crop production by using modern technology and seed
- Use Fallow land
- Change Cropping Pattern
- Incising Cropping Intensity
- Raise the price of crops

Name of the Village : Barigaon
Name of Union : Surma
Name of Upazilla : Sadar

Range of age: (21- 60 Years)
Male female ratio: (2: 3)
Land asset: own and leased in cultivation (range): Own: 30 - 200 decimal, Leased 20-100 decimal
Numbers of supported and non-supported farmers in the group (Supported 11, Non supported 8)
What support they have received: Res plot, demo or seed support (research: 3, Demo 2, Seed support 8
Major crops growing by the farmers (list only 8 those listed in questionnaire): T. aman rice, Wheat, Potato, Mustard

Average area of those crops at present and five years back

Sl. No	Crop Name	Average area of those crops at present (decimal)	Average area of those crops five years back (decimal)	Comments
1	T. aman rice	80	48	
2	Wheat	20	10	
3	Potato	20	5	Cultivate local variety at homestead
4	Mustard	30	10	
5	Boro rice	140	78	

If increase why: List 3-5 causes

1. Increased surface water Irrigation area by excavate of Mugi khal
2.Use more fallow land

Average yield level of those 8 crops at present and five years back

Sl. No	Crop Name	Average yield of crop at present (Ton/ha)	Average yield of crop at five years back (Ton/ha)	Comments
2	T. aman rice	4.72	2.70	
3	Wheat	3.75	2.25	
4	Potato	30.34	16.2	
5	Mustard	1.5	-	
6	Boro rice	6.2	4.15	

If increase why list 3-5 causes:

1. Seed Quality good
2. Crop Rotation/ Variety rotation
3. Use Organic Fertilizer
4. Use Balance fertilizer
5. Develop cultural management (line sowing, Use fertilizer proper time and ratio)
6. Use pesticide/ Fungicide
7. Use irrigation

Fertilizer use increased of not (estimate %): Increased by 150 %
Irrigated area increased or not (estimate %): Increased by 80%
What new varieties they are cultivating now: BRRI dhan 28,29, 19, 40,41.44,46, Satapdi, Diamont, Kardinal, BARI 9, 11 (Mustard) etc
How they have known about those varieties: From CBRMP office, DAE
Source of seeds (collecting from office or own seed): Sometimes collection from office, BADC, Shops, sometimes they supply themselves
Due to CBRMP activities what benefit they have directly received: List 3-5

1.Training
2.Seed
3.Participatory variety selection
4.Advise in field

Are farmers found better off than earlier years like five years back? Yes
If answer is yes why: List 3-5 answers

1. Better production
2. Fallow land utilization
3. Improve Cultivation Technology
4. Seed preservation properly

Estimate average family income of small farmer and marginal farmer at present

average family income of small farmer(per year)	average family income marginal farmer(per year)	Comments
65000.00	35000.00	

Is it higher than five years back? Yes
If yes List the causes or factors (3 to 5):

- More Crop production by using modern technology and seed
- Use Fallow land
- Change Cropping Pattern
- Incising Cropping Intensity
- Raise the price of crops
- Improve communication
- Increase irrigation facilities

Name of the Village : Lalarchar
Name of Union : Aftabnagar
Name of Upazilla : Sadar

Range of age: (20-57 Years)
Male female ratio: (1: 1)
Land asset: own and leased in cultivation (range): Own: 40 - 200 decimal, Leased 30 -100 decimal
Numbers of supported and non-supported farmers in the group (Supported 12, Non supported 10)
What support they have received: demo or seed support (research: 0, Demo-2, Seed support 10
Major crops growing by the farmers (list only 8 those listed in questionnaire): Boro rice, T. aman rice, Sweet gourd

Average area of those crops at present and five years back

Sl. No	Crop Name	Average area of those crops at present (decimal)	Average area of those crops five years back (decimal)	Comments
1	Boro rice	80	50	Irrigation increase
2	T. aman rice	40	20	
3	Sweet gourd	30	13	At homestead

If increase why: List 3-5 causes:

1. Increase surface water Irrigation
2Use fallow land especially sandy soil
3. Taken seed support

Average yield level of those 8 crops at present and five years back

Sl. No	Crop Name	Average yield of crop at present (Ton/ha)	Average yield of crop at five years back (Ton/ha)	Comments
1	Boro rice	4.80	3.90	Flood affected Zone
2	T. aman rice	3.87	3.15	
3	Sweet gourd	10.35	4.5	

If increase why list 3-5 causes

1 Seed Quality good
2 Crop Rotation/ Variety rotation
3 Use Organic Fertilizer
4 Use Balance fertilizer
5 Develop cultural management

Fertilizer use increased of not (estimate %): Increased by150 %
Irrigated area increased or not (estimate %):Increased by 50%
What new varieties they are cultivating now: BRRI dhan 28,29,19,40,41, hybrid (rice and Sweet gourd) etc.
How they have known about those varieties: From CBRMP office, DAE
Source of seeds (collecting from office or own seed): Sometimes collection from office or shop, BADC sometimes they supply themselves
Due to CBRMP activities what benefit they have directly received: List 3-5

1. Training
2. Seed
3. Advise in field

Are farmers found better off than earlier years like five years back: Yes
If answer is yes why: List 3-5 answers

1. Better production

2. More Fallow land utilization
3. Improve Cultivation Technology
4. Seed preservation properly

Estimate average family income of small farmer and marginal farmer at present

average family income of small farmer(per year)	average family income marginal farmer(per year)	Comments
40000.00	22000.00	

Is it higher than five years back?: Yes
If yes List the causes or factors (3 to 5)

- More Crop production by using modern technology and seed
- Use more Fallow land
- Change Cropping Pattern
- Incising Cropping Intensity
- Raise the price of crops
- Improve communication