FY20 ANNUAL PERFORMANCE SURVEY REPORT
OCTOBER 1, 2019 – SEPTEMBER 30, 2020
FEED THE FUTURE BANGLADESH
RICE AND DIVERSIFIED CROPS (RDC) ACTIVITY
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SUMMARY PROGRESS

INVESTMENT (US$)

2018
US$ 56%
PS 44%

2019
US$ 43%
PS 57%

2020
US$ 21%
PS 79%

FIRM LEVEL

2020:
US$ 3,774,429

2019:
US$ 698,873

FARM LEVEL

2020
US$ 83,848,483

2019
US$ 24,648,614

2018
US$ 2,214,629

ACCESS OUTREACH

68%

6,555

2018

57,755

2019

274,091

2020
EXECUTIVE SUMMARY

In FY2020, twenty-eight (28) interventions were signed including eight interventions for COVID 19 contributing to 60 interventions in total to date. Total resources of $1,523,468.48 for 33 interventions was spent in FY2020 where RDC (USG) has contributed $325,437 (21.36%) and leveraged private sector resources of $1,198,054 (78.64%), with an investment ratio of $3.68 between USG and private partners. Of the 33 interventions, performance results of five interventions were reported in FY2019 due to complication of major business activities and investment. The rest, 28 interventions, were considered for performance reporting in FY2020. Figure 2 shows that RDC interventions are resulting increased leveraged amount of the private sector partners, on the other hand USG investment decreased from 56% in 2018 to 21% in 2020.

Estimated access outreach is around 274,091 who are benefited from USAID/RDC facilitations in the agriculture sector in Feed-the-Future (FtF) zone. The outreach includes 1,136 value chain actors and 272,955 farmers/producers (23,794 from non-RDC crops and 249,161 producers from RDC promoted crops). Youth and women respectively belong to 7% and 1% of the total estimated producers. Most producers (73%) reached through inputs services, 16% from end markets (output market) and 12% of producers received RDC facilitated support services like, mechanization, finance, advisory services, ICT etc. Distribution of producers by crops shows that 60% of producers belong to rice cultivation, 14% in sesame, 13% for Maize and the rest for other crops (figure 3). Analysis shows that per access outreach (producer) average investment for USG is $1.19 and for private partners it is $4.39, in total $5.58.

Producers marketed 330,655 MT of commodities worth $83,848,483 (164,332 farmers sold 236,857 MT of rice worth $59,519,713; 34,739 farmers sold 85,329 MT of maize ($17,420,147); 2,271 farmers sold 503 MT of sunflower ($275,335); 37,890 farmers sold 5,152 MT of sesame ($4,378,304); 7,094 farmers sold 1,846 MT of mungbean ($1,432,709) and 2,835 farmers sold 968 MT ground nut, which worth $822,276 in FY2020 (figure 3). The private partners operated their business under 104 Upazilas (21 districts) out of 128 in the FtF zone.

As a result of RDC co-created interventions, an estimated total business value in this reporting year was $3,278,274 which derived from 1,476 MT quality inputs transactions (725 MT Seeds and planting material and 751 MT other non-durable inputs). Total business value under service-related interventions
The APS found that yields for rice (5.95 MT/ha, 6.8%), sunflower (2.09 MT/ha, 56%) and maize (11.46 MT/ha, 69%) increased in 2020 as compared with yields in 2017. Benefit-cost ratio (BCR) is calculated by dividing the gross margin associated with rice production by the operating costs. BCR for these three sectors were also found better than the baseline figures. Yield (2.29 MT/ha, 6.5%) for groundnut also increased as did its BCR [see sub-section for details]. Lower yields were recorded for mungbean and sesame as these two crops were impacted by Cyclone Amphan. At least one technology adoption rate was also impressive for all crops and covered 965.42 ha of land under the technology use in total. There were four major sources on production technology, inputs, and market related information as stated by the producers. These were local farmers/neighbours/relatives, family members/wife, input shops/dealers/retailers and training/farmer learning sessions. Producers also mentioned these information sources were effect among the other information sources listed.

The FtF zone was heavily damaged by the Super Cyclonic Strom Amphan in May 2020. Data show that 35 percent of the 3,150 sampled producers lost their crops by Amphan - approximately 299 MT. Sesame was the most effected crop amongst RDC crops with 84 percent of sesame producers (and 57% of the total quantity of product loss) reported crop damage. Sesame was followed by mungbean (reported by 48 percent of mungbean producers), 35 percent of sunflower producers, and 29 percent of groundnut producers reported on crop damage.

The study tried to find the producers’ reflection on market price for crops grain. Analysis shows that 19 percent of producers said that they didn’t get market price as per their expectation (much lower proportion in the case of maize producers, 7 out of 100), 68 percent reported they obtained their expected prices, 4 percent reported that they got higher prices from their expectation and the rest of them didn’t sold their crops. Most respondents cited that the reason for not obtaining expected prices was that the numbers of Faria/Traders buying from doorstep and hut bazar were reduced as a result of COVID-19.
Poor grain quality as a result of Amphan or floods (30 percent) and limited supply of product in the markets so that buyer didn’t offer competitive price (reported by 12 percent producers) were also reported. Price awareness was also a reason.

With response to COVID 19 emergency, RDC supported seven companies (Bayer, ACI Seed, UOMCSL, Ali Seed, Konika Seed, ACCL and Lal Teer) to ensure distribution of essential inputs and timely procurement at farm level, establish hygienic input sales and procurement points and broadcast safety awareness among value chain actors through physical means and digital mediums. Regarding COVID-19 impact on producers’ household level income and remittances, the APS found that 71 percent of the sampled household had reduced incomes; the negative impact rate is comparatively higher for female, youth, marginal (producers with less than 0.5 acre of land), mungbean, groundnut and sunflower producers. Data shows that 73 percent of producers’ households are not dependent on remittances and 23 percent of households reported that their remittances decreased as a result of coronavirus pandemic. Remarkably, female (29%) and youth (30%) were impacted more compare with male and adult.

During producer catchment area identification, the study team observed and discussed with distribution/supply network actors regarding health safety issues. It has been seen that 37% of actors established hand washing facilities at their shops, and 89% of them established those arrangement from own initiatives whereas 11% received support from private partners.

Women’s involvement has been seen in decision-making in agricultural activities but dominated by males. One third of the respondents mentioned consultative decision between men and women took place in selecting technologies. Agri-farming activities in the FtF zone were predominantly male, as only very lower number of households reported women involvement with few exceptions. As per their opinions, women were mostly involved in post-harvest activities like threshing, deshelling, sorting and bagging. The trend in agricultural income and expenditure is relatively positive compared to the decision-making pattern observed in technology practices. However, it can be correlated to the increased amount of promotional activities, both physical and virtual, that RDC has been co-creating with partners to target women customers with embedded knowledge. To identify the underlying factors that influences the women only or joint decision-making percentage, RDC plans to conduct comprehensive research as in 2021.

The interventions with Bank Asia and City Bank were pilots and as a result the APS found that 30 percent of the producers obtained loans from different organizations (non-partner Banks) last year, with an average loan size around $675 per loan receiver and the average loan size per sampled household was $203. The average loan size of female producers was 36 percent higher than the male as females get concessions such as lower interest or interest free loans. Mungbean producers have the highest per producer loan ($277) as well more Mungbean households receiving credit (39%).

Data shows that 35 percent of the producers have a commercial bank account, higher than in 2019 (29%). Around 63 percent of the respondents mentioned that they can use mobile banking facilities of their own or from other household members accounts and 10% of households can use mobile banking service through outsiders (extended family or friends) accounts. Overall, 72 percent of the sampled households have access to mobile banking. It was found that 98 percent of respondent households own mobile
phones; among them 96 percent of the producers used basic mobile phones as well as 48 percent using smart phones as well. Ownership of smart phone by the respondents was much lower at around 16%, though together with owning a basic phone the percentage owning a phone is 90%.

Women’s diets were largely adequate in terms of food group diversity as well. Among women aged 15-45 years, the calculated minimum dietary diversity was 69.44 percent. The average mean of food item groups for women dietary diversity was 9 (n=3150). This can be considered a positive situation for women and future generations. Data under food insecurity with adjustment of quantity of food intake show that overall around 30 percent of households reported cutdown in the quantity of food consumption compare with last year, 48 percent reported the same as last year and 22 percent reported they consumed more food compare with last year. Analysis of the food insecurity access prevalence based on domains and conditions shows that 9 percent of the sampled households were severely food insecure (access) and 2.41 percent were mildly food insecure (access).

**Learnings:**

Promoted new business items/products (varieties, crop protection products or bio fertilizers) under pilot interventions requires adhoc study to measure their performance and adoption rate. As shorter time span of the expected business growth (lower adoption rate and scattered practicing area) and limited resources of annual performance survey imposes significant challenges to get the catchment area and required number of sample producers.

Collaboration between regional market players and national level input companies can be effective in promoting new products such as inoculum for pulses. At the same time to resolve the supply chain bottlenecks of inoculum, private sector companies need to set up their own production facilities, rather only depend on research institutes.

In the sesame sector, price volatile and natural effect is a big concern for business growth. As this sector is totally depended on export market, where it requires quality grain and specific variety - this specific variety (single skin) is not available in the market because of lower market size. These are the areas where RDC need to focus on in the coming year.

Like sesame, sunflower sector survives with competing with imported sunflower grain, in terms of quality and prices are the factors that need to be carefully addressed. For that it is required to emphasize more on good agronomy practice and quality seed supply which will ensure quality grain production with minimum input cost.
1. INTRODUCTION

The Feed the Future Rice and Diversified Crops (RDC) activity is a USAID-funded project designed to catalyze market system changes that promote a diversified farm management approach oriented to intensified rice and higher-value, nutrient-rich crops production to increase income and improve food security and nutrition in Southern part (21 districts under South-west region) of Bangladesh. RDC undertake the Annual Performance Survey (APS) in FY2020 to measure the annual performance against USAID indicators and to assess the extent of RDC’s contribution in creating opportunities for producers to access quality inputs, services, and end markets as well as gender and social inclusion.

1.1 Activity Objectives

The goal of RDC is “to increase rural incomes by catalyzing a process that leads to competitive and inclusive rice-based market systems”. This includes supporting the private sector to expand their business with small-scale agricultural producers, both men and women, in target areas. **RDC is committed to adopt gender integration throughout its programming, ensuring gender-sensitive approaches and actively pursuing opportunities for effecting transformative social change.** RDC focuses on a transformative process that involves changes in how the market system of Rice and complementary crops (such as Maize, sesame, mustard, sunflower, groundnut, lentil, mung bean) within the rice cropping cycle are structured and how behaviors are incentivized. RDC is facilitating systemic changes in the agriculture market system of is targeted crops through engaging private sector who involves in either agro-input (seed, fertilizer, crop protection, micro-nutrients) distribution, crop procurement and processing, agro-finance, crop insurance, ICT in agriculture, advisory and extension services, agricultural mechanization, and so on. RDC believes that the transformative process will lead to increase yield of agricultural commodities as well as improve product quality that will increase income of participating actors in the respective sectors.

1.2 Study Objectives

RDC undertake the Annual Performance Survey (APS) to assess the extent of RDC’s contribution in bringing about a change in the economic outcomes of input and output market as well as existing market system dynamics of targeted crops/value chains in the Feed the future (FTF) zone. The study, referred to as the Annual Performance Survey also assessed the relevance of RDC interventions. The specific objectives of this study were:

**Objectives**

1. **Impact of RDC**
   To assess the impact (income and food security) of RDC implemented interventions of different sectors/crops.

2. **Access to inputs, services, and end market**
   To assess the piloted interventions how far created opportunities for producers to access quality inputs, services, and end markets.

3. **Inclusion**
   To assess the gender and social inclusion of and uptake by female, youth and poorer as well as their empowerment in FTF zone.
1.3 Study Approach

To address the above-mentioned research objectives of the APS, the study tried to answer the three key research questions:

a. To what extent have piloted interventions created opportunities for producers to access quality inputs, services, and end markets?

b. How have RDC’s promotional activities resulted in the transfer of knowledge and increased awareness for farmers?

c. How are farmers access to inputs, services, and markets resulting in increased income and food security?

For annual performance measurement, this study focused on the performance indicators reference sheet at both producer and value chain actor levels which will reflect the progress of result framework of RDC. To identify relevant actors including producers, used RDC’s result attribution strategy for performance measurement and other RDC approved documents like baseline report, PIRS etc. Under this strategy, “Market catchment area (village) identification” and “Access outreach estimation based on business (input/procurement/service) data” methods were applied in parallel. In this method, product/service users were identified, and before-after situations were compared. For measuring the performance indicators (producers and VC actors), the surveyed data were analyzed following the PIRS instructions. To understand the change, the data of the previous years were considered.

Moreover, to assess changes across the gender issues: empowerment and inclusion of women in the agriculture sector measures were used. The Minimum Dietary Diversity (MDD)\(^1\) scale was used to assess women’s’ food consumption behavior (Women Dietary Diversity). Descriptive and inferential analyses were used throughout the study.

1.4 Study Area, Target Population

The geographic focus for the RDC activity is 21 districts, in Barisal Division (Barisal, Bhola, Jhalokati, Pirojpur, Barguna, Patuakhali), Dhaka Division (Faridpur, Gopalganj, Madaripur, Rajbari, Shariatpur), and Khulna Division (Bagerhat, Khulna, Jessore, Satkhira, Narail, Magura, Jhenaidah, Chuadanga, Meherpur, Kushtia). For the study, six commodities targeted by RDC, namely rice, maize, sesame, sunflower, ground nut and mungbean were assessed. RDC is facilitating systemic changes in the agriculture market system of these crops currently through 28 interventions in the current year. The interventions are varied including agricultural-input (seed, fertilizer, crop protection, micro-nutrients) distribution, crop procurement and processing, advisory and extension services, agricultural mechanization, financial services and so on.

\(^1\)Minimum Dietary Diversity (MDD) is one of the socioeconomic parameters of the beneficiaries with respect to their diversity of food consumption. It is the average of the number of diversified food the beneficiary is consuming from a set of 12 different food groups.
Data was collected from farmers/producers and the market actors who participated RDC facilitated activities or purchased inputs and services (seed, micro-nutrients, crop protection, mechanization and finance) and/or sold their product to private partner companies, living or working in 205 villages and/or wards distributed among the 21 districts. In the Figure 1, the samples were distributed according to their geographic areas and representing the samples of rice, maize, mungbean, sesame, ground nut and sunflower. The samples were collected from the intervention areas taking into consideration all private partners under RDC promoted commodities and business types.

1.5 Quantitative and Qualitative Survey

The study followed Feed the Future’s sampling methodology. Following the USAID guideline, the producers were sampled. “Market catchment area (village) approach” was applied for sampling and identifying the survey respondents from catchment areas during the performance survey to validate the outreach number as well as adoption rate. Multistage sampling method was used to survey the producers based on intervention catchment areas and company coverage for all targeted crops. The complete census method was used to survey the value chain actors following the list provided by lead firms. Structured questionnaire was used for producer, KII’s (Key Informants Interview) were conducted with key producer groups in different catchment areas according to where the RDC’s target commodities were supported.

1.5.1 Survey of Producers

This study applied multi-stage sampling method to identify the producer samples for different RDC facilitated commodities and at the same time taking into consideration the business catchment area (villages) of the private partners. Considering the list of catchment area and commodity wise estimated sample size, determined the number of required catchment areas for producer sampling (10-20 sample producer per catchment area. After that randomly chosen catchment area and from that selected catchment area, using snow balling method, the study team identified inputs or service or market access recipients (i.e. those who received the input/service offered or sold crops to RDC partner companies) of a specific business item in order to generate a list of producers in each catchment area. The supervisors of the survey team also enlisted the female and youth (15-29 years) producers of each business item in all the sampled catchment areas.

Based on the list, survey respondents were selected by the data enumerators. As the number of producers were not equal for different business items in selected catchment areas, the respondents were identified based on proportion to population for each catchment area. The enumerators surveyed 10-20
respondents for each business item in catchment areas. If the minimum target sample could not be met for a specific business item, then all available respondents were surveyed in the catchment area. Female and youth service recipients of any catchment area were included in the sampling.

GPS coordinates of each sampled producers were recorded as part of the information of each respondent. In the listing operation, sampling, process and procedures including the information collection format were developed following the participant-based sampling guideline.

$$n = \frac{N^2 \times Z^2 \times S^2}{\text{MOE}^2}$$

\(n_{\text{initial}}\) - Initial Sample size, \(Z\) - critical value from the normal probability distribution (95% confidence level: 1.96)

\(N\) - total number of estimated participants (access outreach)

\(S\) - standard deviation of the distribution of participants data (0.41)

\(\text{MOE}\) - margin of error (5%)

*Considering 5% non-response rate

Equation 1.1 Sample Calculation for Producers

According to the formula above, the calculated sample size was 3188 (including 5 percent non-response rate) which included the respondents of different interventions. The producers were distributed according to the promoted commodity and business types (i.e. rice, maize, mungbean, sunflower, sesame, ground nut, input sale and procurement, mechanization, finance, ICT). Under this survey, collected 3,150 (2,902) samples based on the availability of the producers from the selected catchment areas.

<table>
<thead>
<tr>
<th>Table 1.1: Sample Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commodities</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Rice</td>
</tr>
<tr>
<td>Maize</td>
</tr>
<tr>
<td>Mungbean</td>
</tr>
<tr>
<td>Sunflower</td>
</tr>
<tr>
<td>Sesame</td>
</tr>
<tr>
<td>Ground nut</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
1.5.2 Survey of Value Chain Actors

Complete census method was adopted for collecting business catchment area identification data from value chain actors (936) of all commodities. Structured interviews (ODK based) were conducted with value chain actors including dealers, retailers, suppliers, processors and other local service providers who were working with RDC partners. Senior Enumerators with agri-business experience was deployed for value chain actors’ survey.

1.5.3 Key Informants Interview with Producer

To understand the context or region specific basic agricultural practices conducted around 100 key informants’ interviews. Through this discussion with key producer, senior enumerators tried to get the general picture on crop specific yield, input cost, market price, methodological preference to receive knowledge on agriculture technologies, gender participation, cropping pattern etc.

1.5.4 Case Studies

There were interviewed selected individuals and businesses for case studies to showcase most significant changes that can be attributed to RDC interventions. 4 cases were documented. Selection of the case studies were done in consultation with RDC and based on “performance results of producers. The objective was to showcase examples of change or results that would reflect project interventions and activities, also the early sign of any larger impact in an intervention.

1.6 Quality Control Mechanism

Quality control involved careful selection of Data Enumerators (DEs), intensive training for the data enumerators and supervisors, field testing of data collection tools, back-checking, spot checking, reviewing accomplishments with targets, and ensuring data quality through regular checking, and data processing.

For data collection, DEs were recruited based on whether they had at least four years of experience in tab-based field data collection, especially in field crops and relevant academic background. For KII and interviews with market actors, only senior enumerators who had previous experience in conducting KII and market actor level interviews were recruited and used for these specific tasks.

RDC provided a 5-day long training followed by field testing for the survey team to ensure quality data collection and efficiency of the process. The training included sessions on the crop cultivation and objectives of the research, understanding the questionnaire, usage of tab in data collection and data syncing in server, data validation and quality control during interviews, and critical issues and challenges during data collection and how to overcome these.

To measure the effectiveness and accuracy of data collection tools using tabs, RDC and CBSG conducted a field test. The study team checked whether the questions given in the tools were appropriate and
represented the content as comprehensively possible to collect all the information needed and further modified the tools based on the result of field testing.

To ensure data quality, data enumerators worked under the supervision of supervisors cum quality control officers (QCO). QCOs ensured timely execution of data collection plan and data quality. An experienced field manager tracked the overall data collection process, coordinated with field team and field data quality control.

Five percent of the filled-in questionnaires were re-interviewed by RDC MEL person for back-checking over phone. The deployed data collection team also reviewed their progress against given targets for each field day during the course of this study. CBSG set targets for the number of samples to be interviewed by DEs for each day and this was five to six samples per day per enumerator. At the end of each field day, the Data Analyst (DA) checked to determine if their targets were accomplished and took necessary actions for the plan for the next field day. DEs shared their data, identified any specific concerns, and shared field for the next day.

The team also conducted data validation. The DA checked the collected data for validity and completeness. Data validation included validating data and database successfully without any missing data. Before data analysis, data was cleaned excluding the outliers (reasonably) according to the RDC PIRS.

1.7 Study Limitations

It was sometimes difficult to get the target number of sample producers in a given area as often farmers were not at their homes and were busy either in their fields or local market. Therefore, the team had randomly selected other areas to ensure target number of samples were surveyed.

During producer survey it was also observed that for newly introduced inputs business items the adoption rate found very low and business area are scattered way distributed, which create challenges to get enough number of samples from each catchment area

During the survey, it was difficult for the enumerators to survey the female producers. As the proportion of the female producers was too small and area specific, it was hard to find female producers in every catchment area.

In case grain procurement sample, many producers did not know the buyers name (traders or faria) who procured their crops through wholesalers. In such cases, the team had to identify the producers through the wholesalers.

Because of COVID-19, though RDC team were not field during the survey, but to ensure the quality RDC followed alternate methods: follow up the field survey, sample back checkup after interview, etc.
2. STUDY FINDINGS

Under this study, the total surveyed sample was 3150 producers. By crops, 929 producers were sampled for rice, 544 for maize, 508 for sesame, 533 for mungbean, 438 for groundnut and 198 for sunflowers. A farmland holding classification of the sampled producers according to Bangladesh Bureau of Statistics (BBS)\(^2\) shows that 5% of sampled producers are categorized as marginal households, 39% small and the rest, 56% are belongs to medium and large categories (annex 1, table 1.1). Crop-wise distribution shows that 53%, 47% and 46% producers respectively for maize, rice and mungbean come from small and marginal categories.

In terms of gender inclusion, it has been found that only 2% of the producers sampled across cropping systems are women. This relates to social norms which discourages women from cultivating field crops and gender inequalities with respect to access to productive assets such as land (annex 1, table 1.2). However, this study found women are generally involved in management practices mainly in cultivation stage and post-harvest management. However, the business case research found that men control production decisions and resources, and women have limited access to land which hinders them from engaging as producers. The groundnut sector engages the largest number of women (6%) of the crops that RDC focuses on, on the other hand rice and maize sector has the least number of women participants, 0.86% and 0.37% respectively.

In youth inclusion, it has been observed that around 8% producers are between 15-29 years (Annex 1, table 1.2). This indicates that youth are not less interested in farming, preferring to focus on other income generating activities for their livelihoods.

Analysis of support/services received by producers shows that among sampled participants, 24% of producers utilized more than one aspect of support. Usage ranged from utilization of multiple inputs made available (e.g. new seed and Trichoderma use) to access to finance, mechanization and

\(^2\) BBS Land classification:<0.5 acre, Marginal; 0.5-1.49 acres, Small; 1.5-2.49 acres, Medium; 2.5 acres or more, Large
end markets. Crop-wise analysis shows that 38% of the sunflower producers received multiple business support (seed, advisory and end market) followed by rice producers (34%).

The percentages of multiple business support stand at 29%, 18%, 17% and 5% respectively for mungbean, sesame, maize and groundnut producers. Further analysis shows that around 24% participants received business support services from multiple interventions. Distribution of crops shows that 35% of rice producers edging out mungbean (30%) receiving business support from multiple interventions. More than one intervention support has been reached by between 10 to 20% cultivators of other RDC promoted crops (annex 1, table 1.3).

Performance results by crops were presented in the subsequent sub-sections.

<table>
<thead>
<tr>
<th>Crop</th>
<th>One intervention</th>
<th>Two or more interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>64.80</td>
<td>35.20</td>
</tr>
<tr>
<td>Maize</td>
<td>85.85</td>
<td>14.15</td>
</tr>
<tr>
<td>Sesame</td>
<td>79.92</td>
<td>20.08</td>
</tr>
<tr>
<td>Sunflower</td>
<td>89.39</td>
<td>10.61</td>
</tr>
<tr>
<td>Groundnut</td>
<td>86.99</td>
<td>13.01</td>
</tr>
<tr>
<td>Mungbean</td>
<td>70.17</td>
<td>29.83</td>
</tr>
<tr>
<td>Overall</td>
<td>76.41</td>
<td>23.59</td>
</tr>
</tbody>
</table>

Figure 7: Intervention Supports by Crops (% of producers)
Flyer 2.1
RICE

5.95
Yield (MT) per hectare

0.37
Average area cultivated per producer (ha)

771
Input cost (USD) per hectare

251
Sales price (USD) per metric ton

65%
Share of sales (MT) in total production

790
Gross margin (USD) per hectare

362
Sales (USD) per producer

Yield increased due to use of GAP and hybrid seeds

Producers applied at least one improved technology

99.9%

Area (hectare) per producers who applied at least one improved technology

0.37

Seed Sales

71%
Increase in seed sales of partner companies in FTF zone because of business expansion

Inputs: Seeds and planting material sales
566 MT
US$ 1,004,759

Inputs: Other non-durable inputs sales
324 MT
US$ 826,536

Inputs: Durable equipment
Number 23
US$ 458,333

Services: Business Services
Number 3,110
US$ 37,822

Copying in
- Average 1.44 per producer
- Other producers (average 8.04 per producer)
- Copied technology from 18% producers

Grain sales by producers
236,857 MT
US$ 59,519,713

The average area cultivated per producer for rice production decreased because farmers struggled with the continuously increasing input cost, fluctuating market price of rice and profitability.
2.1 RICE

In the rice sector, RDC have been continuously facilitating to national and regional private partners to ensure supply of improved quality rice seed to producers in the Feed-the-future (FtF) zone, South-west region of Bangladesh. It has initiated several interventions through its partners towards helping rice producers to get better productivity and profitability. This sub-section describes the performance results of these initiatives.

2.1.1 Intervention Performance

Private partners interventions, for helping seed and seedling supports to producers, were facilitated with various Agribusiness companies of Bangladesh. They are: ACI Seed and Seedling, Ali Seed, Konika Seed Associates, Petrochem, Bayer Crops Science, METAL Agro, METAL Pvt., Auto Crops Care Limited, and UOMSCL. Among them, two regional private partners, Konika and UOMSCL, ensured a buyback guarantee of rice seed and grains from the producers and to supply the grains to the processing mills. Besides supplying the quality seeds to producers, nine interventions (ACI, ACCL, Bayer Crops, NAAFCO, KONIKA Seed, Partex Agro, Petrochem Ltd, and Xplore Ltd) were also initiated to make quality bio/organic fertilizer and crop protection products available to producers to use in multiple crops (RDC facilitated crops or other crops) cultivation. As part of support market system, for financial inclusion, RDC facilitated interventions with Bank Asia directly and with City Bank through Konika. RDC also co-created intervention with METAL for enabling mechanization support through different service providers to producers.

In this reporting year several planned field activities could not be performed from March onwards due to Covid-19. Almost all partner companies had to make alternative plans and re-strategize their approaches to achieve their targets. RDC facilitated companies with ability to adapt during the COVID pandemic and encouraged them to adopt new methodologies for marketing and promotion. For example, promotional events at haat bazaars had to cancelled as public gatherings are not being allowed. Van miking (broadcasting with speakers) was used as a replacement of that activity, where a branded van traveled to the proximity of farmers houses to create product awareness. In addition, the establishment of different digital platforms could accommodate different value chain actors (farmers, input company, processors) to share expertise and experience in an interactive way.

As a result of RDC co-created interventions, estimated total business value in this reporting year was $58,38,178, which derived through 565 MT quality seeds transactions (353.14 MT high yielding varieties, 212.05 MT hybrid varieties); 36,085,095 (number) seedling sales; 8,825 MT seed and grain procurement; 324 MT bio/organic fertilizer and CPP products supply; helped to deploy 23 Combine Harvesters and two Rice Transplanter for providing services to producers [source: RDC LEAP database, business report].

![Figure 8: Access Outreach in 2020, Rice](image)
An estimated 164,332 producers, which includes 1,415 women and 11,852 youths under 29 years old in rice crops cultivation, have access to inputs, services, and end markets. Of these, 87,985 producers were reached through supplying quality seeds; 64,309 producers through crop protection products (CPP) and bio/organic fertilizer; 2,194 producers through grain procurement; 7,578 producers through mechanization services and 2,266 producers through financial services. The average beneficiary transaction value (input procurement) was $35.35.

### 2.1.2 Performance Results

To gain insights of the performance of RDC co-created interventions, 929 producers or small farm holders (producers with less than 5 ha land, USAID definition), were sampled for rice crops. Of them, 99.1 percent were males and 0.9 percent were female producers. Age-wise classification shows that 7.2 percent producers were youth of age 15-29 years and remainder (92.8 percent) were adult, above 30 years. Household classification on land holdings as per Bangladesh Bureau of Statistics (BBS), it has been found that 42 percent of the sampled producers belong to small farm category, 30 percent in medium farm, 23 percent in large farm and only 5 percent of producers fall in marginal farm group. Thus, the majority of sampled producers (71.47 percent) were representing the small and medium farms producer.

#### 2.1.2.1 Productivity and Returns

As shown in Flyer 2.1 and Annex 2, Table 2.1, the yield increased to 5.95 MT per ha in 2020 which was 6.8 percent point higher than the yield of 2017 (5.57 MT/ha). One sample t-test shows a statistically significant difference in per ha mean yield between 2017 and 2020, t (928) = 7.9, p = .000. The study finds that the smaller plots have the higher per ha yield. Based on the FGDs with the rice producers, it was inferred that improved quality seed and cultivation practices were the main reasons for higher yield. As per data, RDC promoted rice varieties, such as Shera, Folon, ACI-1 (despite few negative feedback on germination), BRRI dhan-81, BRRI dhan-74, Agro dhan-14 and BRRI dhan-84 all has yield over 7 MT per ha.

Data show that 65 percent of the total production sold to end markets, 23 percent of production utilized for household consumption, 6 percent stored for late sales, 5 percent of production shared for labor or harvesting purposes, and 0.2 percent kept for seed. The balance was damaged in post-harvest stage (reported by 25% of producers with an average per producer loss of 0.03 MT) due to birds or animal attack, poor threshing, pest attack, rain/Amphan and insufficient drying and cleaning facilities and as these reasons were largely cited by the loss reporting producers (Annex 2, Table 2.2).
Flyer 2.1.2

Yield (MT) per hectare
- 2020: 5.95
- 2019: 6.83
- 2018: 5.81
- 2017: 5.57

Cash profit (USD) per producer
- 2020: 101
- 2019: 3
- 2018: 53
- 2017: 37

Input cost (USD) per hectare
- 2020: 771
- 2019: 931
- 2018: 831
- 2017: 816

Sales (USD) per producer
- 2020: 362
- 2019: 439
- 2018: 523
- 2017: 501

Gross margin (USD) per hectare
- 2020: 790
- 2019: 499
- 2018: 699
- 2017: 624

Sales price (USD) per metric ton
- 2020: 251
- 2019: 199
- 2018: 255
- 2017: 250

Percentage of metric ton sold out of total production
- 2017: 60%
- 2018: 59%
- 2019: 64%
- 2020: 65%

Average area cultivated per producer (ha)
- 2017: 0.60
- 2018: 0.60
- 2019: 0.51
- 2020: 0.37

Areas under improved technology per farmer (ha)
- Climate Risk Management: 0.12, 0.28, 0.32, 0.00
- Crop Genetics: 0.39, 0.28, 0.32, 0.00
- Cultural Practices: 84%, 89%, 0.32, 0.00
- Marketing and Distribution: 47%, 47%, 0.00, 0.00
- Others: 68%, 68%, 0.00, 0.00
- Pest and Diseases Management: 0.25, 0.28, 0.32, 0.00
- Soil-Related: 0.23, 0.25, 0.32, 0.00

Farmers applying technology
- 2017: 39%
- 2018: 84%
- 2019: 89%
- 2020: 89%

- Climate Risk Management: Use of combined harvester; finance access through agent’s banking/retail micro merchants
- Crop Genetics: Age of seedling (20-30 days); line transplanting
- Cultural Practices: Grain and seed contract farming; crops sales through aggregator, procurement hub, from farmer doorsteps.
- Marketing and Distribution: Use fertera, fungicides; herbicide
- Others: Fertera use; use organic fertilizer (Biotech, Bumper, compost, etc.); use micro nutrients (gypsum, boron magnesium, zinc, etc.)
- Pest and Diseases Management: Hybrid; fine grain varieties
- Soil-Related: Hybrid; HYV; zinc enriched; fine grain varieties
The study finds that despite the average market price ($251 per MT in FY2020) of rice grain increased only by 0.6 percent but at the same time with a decreased input cost ($771 per ha in FY2020) by 5 percent as results of appropriate management practice or mechanized farming, producers reported more profit compared to 2017. Average gross margin per ha increased by 26 percent from $624 in 2017 to $790 in 2020. On the other hand, the sales value ($362 in 2020) per producer declined from 2017 by 28 percent, as a large portion of production was (23 percent grain) used for household consumption, 6 percent stored for late sale and 4% shared. However, the cash profit per producer from the sales raised sharply to $101 in 2020 as compared with the baseline $37 in 2017.

Benefit-cost ratio (BCR) is calculated by dividing the gross margin associated with rice production by the operating costs. Overall, rice sector has had its best BCR in 2020 (1.02) as compared with 0.53, 0.84 and 0.76 respectively in 2019, 2018 and 2017. BCR is much larger (1.05) for adult producers than youth (0.67) and sampled producers in 2020.

The analysis (Flyer 2.1.2) shows that the cultivation area of rice per producer decreased in 2020 from 2017 by 39 percent. The average cultivation area for rice was 0.6 ha in 2017 which decreased to 0.37 ha per producer in 2020. As most of the interventions promoted recently released varieties, the average cultivated area for those varieties were found lesser in compare with varieties found in baseline. However, their adoption rates are still very low, yield is tremendously high and grain market price is also higher in compare with regular varieties.

Pearson correlation was done to assess the relationship among gross margin, cash profit, cultivation area, yield and input cost and average market price per MT. There was a moderate positive correlation between gross margin and sales price of rice, which was statistically significant at the 0.01 level (r=.440, n=929, p=000). Yield correlated positively with gross margin (r=.535, n=929, p=000) and cash profit (r=.301, n=929, p=000), which were significant at the 0.01 level. Pearson correlation also showed a positive correlation between cash profit and market price (r=.218, n=929, p=000). Similar result was also seen between cash profit and area (r=.218, n=929, p=000). Test suggests that if cultivated area, price and yield increase, the gross margin and cash profit of the producers will also increase.

The study further digs into details of rice seed and grain selling locations and reasons behind choosing the places. It has been seen that around 41 percent respondents preferred to sale grain from farm gate or home, 34 percent preferred in village markets, 32 percent preferred to wholesale traders, and 19 percent preferred other places for selling grain. The reasons mentioned to prefer these places for grain marketing were 50 percent respondents mentioned “make immediate payment”, 46 percent mentioned “buy bulk amount”, 36% mentioned “pay high price”, 35%
mentioned “not require transportation cost “ 29 percent mentioned market located nearby of their home. However, it has been found that around 19 percent of producers mentioned that they get the lower price than their expectation because of limited numbers of buyers to purchase grain from doorsteps (reported by 38% of the producers who said lower price and 7% of the sampled producers), 18 percent of the producers reported limited farias/buyers in the local markets during COVID-19, and 13 percent of the producers reported poor grain quality due to Amphan.

2.1.2.2 Technology Adoption

Analysis on the cultivation practices shows that there is an increasing trend over the years on the use of improved technologies in terms number of producers as the RDC activities progress. Survey data showed that 99.89 percent of the rice producers applied at least one improved technology in 2020 which was 98 percent in 2018. On an average 0.37 ha per producer was under (at least one) improved technology in 2020 which was 0.40 ha per producer in 2018. Technology like crop genetics used by 84 percent rice producers mainly the hybrid and improved quality rice varieties under 0.28 ha per producer; where around 90 percent rice producers were reported the use of recommend line transplanting method, use of rice weedier and transplanter at 0.32 ha per producer; 68 percent producers were found to follow pest and disease management at 0.25 ha per producer; 62 percent producers adopted soil fertility management at 0.23 ha per producer land and in case of mechanized harvesting only 9% producers adopted this. Since, there were few output market interventions in rice sector, only 48 percent producers practiced improved marketing and distribution technology (Annex 3, Table 3.1 and Table 3.2).

The one-way ANOVA test was done to understand the impact of technology use on yield per ha. From the analysis it was found that there was no significant impact between groups of different level of technology use on yield per ha (F (6, 895) = 0.760, p=.602). Post hoc testing revealed no significant differences between the number of technologies uses by the producers. However, mean yield per ha increases as the use of number of technologies increased e.g. mean with two technologies is (M=5.90, SD=2.04) and use of seven technologies the mean is 6.37 mt per ha.

Existing technology adoption rate suggests that there is room for creating accessibility in climate risk management and mitigation, mechanized harvesting, finance, and end market access. It is also evident that in case of newly promoted nutrient rich rice varieties, the adoption rate is found significantly low because of producers are less aware and insignificant market share by these verities.

2.1.2.3 Sources of Information and Attitudes

Regarding production technology, inputs, and market related information, from the survey it has been found that local farmers, neighbors, or relatives play an important role as around 65 percent respondents used them as one of information resource. Input dealer and retailer were seen very useful information source (mentioned by 14% of respondents) especially in soil related, pest and diseases management and crop genetics aspects. Family members, such as wife also seen active towards information resource particularly in marketing and distribution, and cultural practices. Producers received mechanization (others) related information from local service providers (35% producers). Information was also gathered
Focus group discussions with producers also revealed very similar patterns in the case of analyzing existing practices of obtaining information on production technologies and inputs. Three-fourth FGD participants utilized information from local/neighbor farmers and input retailers, one-fourth participants utilized information from training and DAE, and negligible participants depend on other sources. It has been found that two-third participants preferred input retailers/dealers, neighbors/local framers, and one-third participants preferred hat bazaar campaign, video show and learning sharing sessions to obtain information on production technologies and inputs.

Existing practices of obtaining market related information show that two-third participants mentioned whole seller and local traders (faria), and one-third participants received information from neighbors/local farmers and hat bazaar. While asking their preferences to obtain market related information, most of the participants mentioned wholesaler either physically or over phone. As many as one third participants preferred to get information from neighbors and local traders.

Around 98 -100 percent of the respondents reported that they will continue to use the adopted technologies in the upcoming seasons and years. Only negligible percent were mention discontinuation as they found the input cost is high and the performance was not much satisfactory. Overall, in rice sector, 18% of respondent producers disseminated the technological knowledge to their neighbors' producers and per producer knowledge or information dissemination rate was estimated at 1.44 producers.

### 2.1.2.4 Gender

The gender engagement in rice cultivation activities (figure 11) is found to be predominantly male. The male producers were found to be heavily engaged in land preparation, seed preparation, transplantation, fertilizer application, pest and disease control, weeding, irrigation, harvesting, and transportation where very few females were observed. Women are mostly involved in post-harvest activities like threshing, deshelling, sorting, and bagging. Around 96 percent respondents reported threshing, drying, and cleaning activities performed by female. Seedling raising (35%) and grain storage (32%) were the other areas where relatively higher percentage of women involvement were seen. However, one in every fifth respondents reported that women also get involved in selling products.
Data on the decision-making process at different stages of crop cultivation and marketing show that in the case of variety selection, 65% of the respondents reported that the decision was made by only male members, for 34 percent cases consultative discussion between men and women household members was taken places before making decision, and only for 1% case females made decision. For culture management or practice, 70% of respondents reported that decision was made by male members, and 29% men decided through discussion with females, and less than one percent female made decision through discussion with male members in the households. For grain marketing, 54% male members alone made the decision, another 43% reported that the decision was made through discussion with female members and little over one percent female took the decision (Annex 3, Table 3.3 and Table 3.4).

In the case of agriculture expenditure, 45% of the respondents reported that husband made decision after getting consent from wife or female members, 53% respondents reported male member took the decision himself and negligible percentage reported that female made decision through discussion with husband or other male members. The results reflected that in decision making for agriculture expenditure, male members took decision either himself alone or through discussion with wife or female member, therefore, there is room for improvement in regard to women participation in decision making process. Further analysis on making decision for expenditure from agriculture income shows a very similar pattern as seen in agriculture expenditure. Little over 56 percent respondents reported that male made the decision through getting consent from wife or female members, whereas 43 percent respondent reported male member alone made the decision and about one percent female took decision either alone or consulting with male members.

### 2.1.2.5 Amphan and COVID 19 Impact

The study revealed that 71% of rice households have a negative impact on household level income and 23% of the survey households reported a decreased remittance inflow due to COVID 19 pandemic. Rice production loss due to Amphan/flood at pre-harvesting and post-harvesting periods was also. Data show that 20.34% of the sampled producers had pre-harvesting production loss and estimated loss was 0.31 MT per loss reporting producer. Analysis shows that 6.46% of the producers had post-harvesting loss due to natural calamities and 0.05 MT production per loss reporting producer was estimated. Despite this natural disaster and covid-19, the overall agri-farming income as reported by the respondent stands at $1,935.22 per rice producer household in 2020. Data show that producers invested a bulk-portion (38%) of their income to agri-farming, spent 26% for purchasing foodstuff, kept 5% to savings or deposit, spent 4% to social recreation purposes, made 3% to loan repayment, and spent the rest of the amount to meet the basic needs and shelters.
Flyer 2.2
MAIZE

Yield (MT) per hectare: 11.46
- Yield increased due to use of better-quality seed and improved management practices

Average area cultivated per producer (ha): 0.23

Input cost (USD) per hectare: 1073

Sales price (USD) per metric ton: 204

Share of sales (MT) in total production: 93%

Gross margin (USD) per hectare: 1268

Sales (USD) per producer: 502

Producers applied at least one improved technology: 100%

Area (hectare) per producers who applied at least one improved technology: 0.23

The gross margin (USD) per hectare increased significantly, due to yield, market price and grain quality

Seed Sales

More than 100% increase in input sales of the companies in FTF zone

Seed Sales

- Inputs: Seeds and planting material sales
  - 150 MT
  - US$ 980,827
- Inputs: Other non-durable inputs sales
  - 151 MT
  - US$ 92,338
- Inputs: Durable equipment’s
- Services: Business Services

Copying in

- Average 0.51 per producer
- Other producers (average 2.94 per producer)
- Copied technology from 17% producers

Grain sales by producers

- 85,329 MT
- US$ 17,420,147
2.2 MAIZE

In the maize sector, RDC have been continuously facilitating to national and regional private partners to ensure supply of improved quality maize seed and quality bio/organic fertilizer and crop protection products to producers in the Feed-the-future (FtF) zone, South-west region of Bangladesh. It has initiated several interventions through its partners towards helping maize producers to get better productivity and profitability. This sub-section describes the performance results of these initiatives.

2.2.1 Intervention Performance

RDC co-created private partners interventions with various agribusiness companies of Bangladesh for helping producers with seed, bio/organic fertilizer and crop protection product supports. The private partners are: ACI Limited, Petrochem Bangladesh Ltd., Auto Crop Care Ltd., for seed support. For quality bio/organic fertilizer and crop protection products support interventions facilitated with Bayer CropScience, Partex Agro Ltd., and Xplore Business Ltd to use in multiple crops cultivations. Most of the private partners are national level companies.

As a result of RDC co-created interventions, an estimated total business value in FY2020 was $10,73,165, which derived from 150.48 MT quality seeds transaction; 151 MT bio/organic fertilizer and CPP products supply in the FtF Zone [source: RDC LEAP database, business report]. An estimated 34,739 producers, which includes 128 women and 3,321 youths of age between 15 and 29 years in maize crop cultivation, have access to inputs and services. Of these, 30,015 producers were reached through supplying quality seed and 4,724 producers through crop protection products (CPP) and bio/organic fertilizer.

2.2.2 Performance Results

To measure the performance of RDC co-created interventions, 544 producers or small farm holders (producers with less than 5 ha land, USAID definition), were sampled for maize crop. Of them, nearly 100 percent were males and only 0.3 percent were female producers. Age-wise classification shows that 10 percent producers were youth of age 15-29 years and remainder (90 percent) were adult, above 30 years. Household classification on land holdings as per Bangladesh Bureau of Statistics (BBS), it has been found that 45 percent of the sampled producers belong to small farm category, 29 percent in medium farm, 19 percent in large farm and only 7 percent of producers fall in marginal farm group. Thus, the majority of sampled producers (74 percent) were representing the small and medium farms producer.
2.2.2.1 Productivity and Returns

As shown in Flyer 2.2 and Annex 2, Table 2.1, the yield increased to 11.46 MT per ha in 2020 which was 69 percent point higher than the yield of 2017 (6.78 MT/ha). One sample t-test shows a statistically significant difference in per ha mean yield between 2017 and 2020, t(543) = 33.68, p = .000. The study finds that the marginal producers have the lowest yield (9.2 MT/ha) in compare with small, medium, and large farmers (above 11 MT/ha). Based on the FGDs with the maize producers, it was inferred that improved quality seed and cultivation practices were the main reasons for higher yield. As per data, RDC promoted maize varieties, such as CORTEVA Maize Seed Varieties-30V92, P3355, P3388, P3396, ACCL-Everest, ACI-ADV757, Don111 all having higher per ha yield. Gender-wise analysis shows that female producers have the lowest per ha production (6.78 MT/ha) and youth producers have the highest production, 11.47 MT/ha.

Data show that majority (93 %) of the total production sold to end markets, only 3 percent of production kept for household consumption and 3 percent stored for late sales. No farmer kept maize as seed as all the promoted varieties was hybrid seed (as germination is not possible). There was no major negative impact on maize caused by rain or Amphan as reported by the producers (Annex 2, Table 2.2).

The study finds that the average market price ($204 per MT in FY2020) of maize grain increased by 7 percent while input cost ($1,073 per ha in FY2020) increased by 66 percent. The yield increase, by virtue of quality hybrid seed use and appropriate management practices made up for the increased input costs. Average per ha gross margin is found increased by 96 percent from $647 in 2017 to $1,268 in 2020. Per producer sales value ($502 in 2020) rose by 34 percent from 2017. The cash profit per producer from the sales raised sharply to $255 in 2020 as compared with baseline, $173 in 2017.

Overall, the maize sector had its best BCR in 2020 (1.18) as compared with 0.85, 1.16 and 1.00 respectively in 2019, 2018 and 2017. BCR is much larger (3.16) for youth producers than adult (2.58). On the other hand, BCR is much higher for male (2.64), in compare with female (0.96) and sampled producers in 2020. The analysis (Flyer 2.2.2) shows that the cultivation area of maize per producer decreased in 2020 from 2017 by 27 percent. The average cultivation area for maize was 0.31 ha in 2017 which decreased to 0.23 ha per producer in 2020.

A Successful PCL Maize Farmer,
- more yield, better price, and more cash profit
  -  [years, male]: Moheshpur, Jhenidah.

Before the project/PCL intervention, getting the improve quality maize seed was one of the major constraints for [male]. However, with improved quality seeds (variety PCL-P3355) in 2018-19 Robi season, he cultivated maize in 2 acres of land. Getting better yield, incremental price, and more benefit from this variety, he engaged more lands in 2019-20 for maize cultivation.

In 2019-20 season, he cultivated PCL-P3355 maize variety in 3.3 acres of land and received good quality seeds from retailers, and participated learning sessions on advanced cultivation techniques from PCL and he put his knowledge into practice and enjoyed better results.

In 2019-20, yield per ha was 13.48 MT with PCL maize 3355 variety. Mr. total harvest was around 18 MT and sold value was $4,286 with a net profit of $2,500. In addition to this, traders were always ready to buy this variety grain with an incremental price, around $12 more per mt than other sorts, and getting around $180 more to his profit (10% of his total maize production cost). Mr. [male] opined PCL-P3355 maize variety takes only two days to get fully dried and if necessary, he can dry them in the field and can sell directly from the field with fully dried condition.

Other farmers in his village are approaching him as to the secret of his success. He recommends the PCL variety. He is now recognized as the lead maize farmer, the champion!
Pearson correlation was done to assess the relationship among gross margin, cash profit, cultivation area, yield and input cost and average market price per MT. There was a strong positive correlation between gross margin and yield of maize, which was statistically significant at the 0.01 level (r=.645, n=544, p=000). Similar result was also seen between yield and cash profit (r=.593, n=544, p=000). Price per mt correlated positively with gross margin (r=.274, n=544, p=000) and cash profit (r=.235, n=544, p=000), which were significant at the 0.01 level. Pearson correlation also showed a positive correlation between cash profit and area (r=.218, n=544, p=000). Test suggests that if cultivated area, price and yield increase, the gross margin and cash profit of the producers will also increase.

The study further looked into maize grain selling places and reasons behind choosing the places. It has been seen that around 48 percent of the respondents preferred to sale grain at farm gate or home, 34 percent preferred wholesale traders or markets, 22 percent preferred to sale at village retail markets, and only 1 or 2 percent preferred other places for selling grain. The reasons mentioned to prefer those places for grain marketing were 68 percent respondents mentioned “make immediate payment”, 62 percent mentioned “buy bulk amount”, 63 percent mentioned “pay high price”, 46 percent mentioned “not require transportation cost” and 37 percent mentioned market located nearby of their home. However, it has been found that majority of producer (83%) reported that they got expected grain price, only 7 percent of producers mentioned that they get the lower price than their expectations because of limited buyers purchasing grain from doorsteps (reported by 18%) and 8 percent were not aware on market price, 14 percent of the producers reported limited faria/buyers in the local markets during COVID-19 pandemic.

In case of maize production, 27 percent sampled producers reported there was production loss because of pest attack (reported by 47% of the loss reported producers). It is worth mentioning here that RDC already has taken initiative with private partners for introducing falwigen in collaboration with CIMMYT.

### Technology Adoption

Analysis on the cultivation practices shows that there is an increasing trend over the years on the use of improved technologies in terms number of producers as the RDC activities progress. Survey data showed that 100 percent of the maize producers applied at least one improved technology in 2020 and it was 99 percent in 2018, who applied at least one improved technology. On an average, in 2020, per producer under (at least one) improved technology was 0.23 ha and it was 0.27 ha per producer in 2018.
Technology like crop genetics used by 98 percent maize producers and they mainly used the hybrid maize varieties under 0.23 ha per producer; where around 94 percent maize producers reported that they followed culture practice at 0.22 ha per producer; 54 percent producers were found to follow pest and disease management at 0.14 ha per producer; 72 percent producers adopted soil fertility management at 0.17 ha per producer land and in the case of post-harvest management 87% producers adopted this. Although RDC didn’t facilitated output market interventions in maize sector it was found that 48 percent producers practiced improved marketing and distribution technology. Existing technology adoption rate suggests that there is room for creating accessibility in pest and disease management, finance, and end market access (Annex 3, Table 3.1 and Table 3.2).

The one-way ANOVA test was done to understand the impact of technology use on yield per ha. From the analysis it was found that there was no significant impact between groups of different level of technology use on yield per ha (F (9, 532) = 0.863, p=.558). Post hoc testing revealed no significant differences between the number of technologies uses by the producers. However, mean yield per ha increases as the use of number of technologies increased e.g. mean with three to four technologies is 11.3 mt per ha and use of seven technologies the mean is 12 mt per ha.

2.2.2.3 Gender

The gender engagement in maize cultivation activities (Flyer 2.7) is found to be predominantly male. The female producers were found to be largely engaged in post-harvest activities like threshing, deshelling, sorting, and bagging. Around 98 percent respondents reported threshing, drying, and cleaning activities performed by female. The other relatively higher percentages of women involvement were seen were seedling raising (16%), grain storage (32%) and 9 percent respondents reported that women also get involved in selling products.

Data on the decision-making process at different stages of crop cultivation and marketing show that mostly male dominated decision-making process for maize. In the case of variety selection, 73 percent respondent reported that the decision was made by only male members, for 27 percent cases consultative discussion between men and women household members was taken places before making decision, and female members alone didn’t take any decision at all. For culture management or practice, 78 percent of respondents reported that decision was made by male members, and 22 percent men decided through discussion with female members. For grain marketing, 64 percent male members alone made the decision, another 35 percent reported that the decision was made through discussion with female members and little over 0.4 percent cases female took the decision (Annex 3, Table 3.3 and Table 3.4).

In the case of agriculture expenditure, 33 percent respondents reported that husband made decision after getting consent from wife or female members, 67 percent respondent reported male member took the decision himself. From that results it is reflected that in decision making for agriculture expenditure, male members took decision either himself alone or through discussion with wife or female member, therefore, there is room for improvement in regard to women participation in decision making process. Further analysis on making decision for expenditure from agriculture income shows a very similar pattern as seen in agriculture expenditure. Little over 43 percent respondent reported that male made the decision.
through getting consent from wife or female members, whereas 57 percent respondent reported male member alone made the decision and about 0.2 percent female took decision either alone or consulting with male members.

2.2.2.4 Amphan and COVID 19 Impact

The study revealed that in case of maize production only 10 percent maize producer reported production loss for rain fall with negligible amount but 62 percent maize producers reported a negative impact on household level income and as many as 12% of the survey households reported a decreased remittance inflow due to global coronavirus pandemic than their usual time. Despite this natural disaster (Amphan) and global COVID 19 pandemics, the overall agri-farming income as reported by the respondent stands at $2,188 per maize producer household in 2020. Data show that producers invested a bulk-portion (38%) of their income to agri-farming, spent 26% for purchasing foodstuff, kept 6% to savings or deposit, spent 4% to social recreation purposes, made 3% to loan repayment, and spent the rest of the amount to meet the basic needs and shelters.
Flyer 2.3
MUNGBEAN

- Yield (MT) per hectare: 0.83 (2%)
- Average area cultivated per producer (ha): 0.36 (29%)
- Input cost (USD) per hectare: 25 (62%)
- Sales price (USD) per metric ton: 7.76 (5%)
- Share of sales (MT) in total production: 86% (27%)
- Gross margin (USD) per hectare: 39.1 (18%)
- Sales (USD) per producer: 202 (8%)

Effect of heavy rainfall due to Amphan adversely affected mungbean production

- Producers applied at least one improved technology: 100%
- Area (hectare) per producers who applied at least one improved technology: 0.36

Procurement

- 100% increase in procurement of lead firms

Copying in
- Average 3.26 per producer
- Other producers (average 10.45 per producer)
- Copied technology from 31% producers

Inputs:
- Seeds and planting material sales: 2 MT, US$2,763
- Other non-durable inputs sales: 54 MT, US$46,496
- Durable equipment
- Services: Business

Grain sales by producers:
- 1,846 MT, US$1,432,709
2.3 MUNGBEAN

In the mungbean sector, RDC have been continuously facilitating to national and regional private partners to ensure supply of improved quality rice seed and bio fertilizer/ Crop protection products to producers in the Feed-the-future (FtF) zone. It also helped to create market access for the producer to ensure better market price. It has initiated several interventions through its partners towards helping mungbean producers to get better productivity and profitability. This sub-section describes the performance results of these initiatives.

2.3.1 Intervention Performance

Only one private partners intervention, for helping quality seed supports to producers, was facilitated with Agribusiness company (Konika Seed Company) of Bangladesh. For making available inoculant, bio fertilizer and crop protection products, RDC facilitated around five interventions with ACI Fertilizer, Xplore Business Ltd., Partex Agro Ltd., NAAFCO (Pvt.) Ltd., and Bayer CropScience. To create end market access, it also facilitated one intervention with Pran Agro Ltd. As part of support market system, for financial inclusion, RDC facilitated interventions with Bank Asia directly and with City Bank through Konika.

Considering all those interventions, total business value in this reporting year was $656,181, which derived through 2.1 MT quality seeds transaction; 53.6 MT inoculant, bio fertilizer, and crop protection products; and 801 MT grain procurement. [source: RDC LEAP database, business report]. All those volumes of inputs and grain procurement supplied or distributed through value chain actors. This business transaction helped to create access for 7,094 producers., which includes 200 (3 %) women and 506 (7%) youths under 29 years old in mungbean crops. Amongst those, 4,104 producers were reached through supplying quality inputs (seed and fertilizer); 2,990 producers through grain procurement.

2.3.2 Performance Results

To understand the performance results of facilitated interventions, 533 mungbean producers interviewed, selected following statistical sampling procedure. Of them, 97 percent were males and 3 percent were female producers. Age-wise classification shows that 7 percent producers were youth of age 15-29 years and remainder (93 percent) were adult, above 30 years. Considering household land classification, the study found that 41 percent of the sampled producers belong to small farm category (land holding 0.5-1.49 acre), 26 percent in medium farm (land holding 1.5 – 2.49 acre), 28 percent in large farm (land holding 2.5 acre and above) and only 5 percent of producers fall in marginal farm group (below 0.5 acre land). Thus, the majority (67%) of sampled producers were representing the small and medium farms producer and female percentage found little bit higher in compare with rice and maize crops, not too much change reflected in youth and adult. In comparison with others crops, mungbean yields were most affected adversely by Amphan and flooding.
2.3.2.1 Productivity and Returns

As shown in Flyer 2.3 and Annex 2, Table 2.1, the yield per ha was 0.83 MT (0.96 MT if we exclude the producers who lost their production due to Amphan) in 2020 which is slightly less than 2017 (0.85 MT) by 2.4 percent. One sample t-test shows a statistically significant difference in per ha mean yield between 2017 and 2020 (p<.001). Based on the information obtained from meetings with partners and FGDs with producers, natural disasters like heavy rainfall, cyclone Amphan and flood water adversely affected mungbean production in 2020. The sales volume per producer also decreased by 12 percent compared with 2017. The gross margin in 2020 also reduced by 18 percent from 2017, amounting to $391 per ha, but comparatively higher than last year (2019). The producers did not get the expected yields, so the cash profit of the producers was $110 in 2020 which was 21 percent less than 2017. The sales price per MT ($776) of the mungbean increased by five percent in 2020 over 2017.

The production distribution shows that 86 percent of the total production sold to end markets, 4 percent of production utilized for household consumption, 3 percent kept for seed, 2 percent stored for late sales and 2 percent for shared as labor cost (Annex 2, Table 2.2). Around 48 percent of producers reported yield loss because of climatic events, with an average per producer loss of 0.12 MT yield.

Benefit-cost ratio (BCR) is calculated by dividing the gross margin associated with rice production by the operating costs. Overall, the mungbean sector BCR in 2020 was 1.54, compared with 1.07, 2.49 and 3.03 respectively in 2019, 2018 and 2017 but still profitable despite a heavy loss. This suggests that for Mungbean sector, it requires to work on climate adaptive varieties and further yield improvement.

The analysis (Flyer 2.3.2) shows that the cultivation area of mungbean per producer decreased in 2020 from 2017 by 29 percent. The average cultivation area per producer for mungbean was 0.51 ha in 2017 which decreased to 0.36 ha per producer in 2020. Because of cyclone and flood, producers diverted to other crops cultivation instead of mungbean production.

Pearson correlation was done to assess the relationship among gross margin, cash profit, cultivation area, yield and input cost and average market price per MT. There was a moderate positive correlation between gross margin and yield of mungbean, which was statistically significant at the 0.01 level (r=.795, n=533, p=000). Market price correlated positively with gross margin (r=.460, n=533, p=000) and cash profit (r=.471, n=533, p=000), which were significant at the 0.01 level. Pearson correlation also showed a negative correlation between area and cash profit (r=-.222, n=533, p=000). Similar result was also seen between gross margin and area (r=.251, n=533, p=000). Test suggests that if price and yield increase, the gross margin and cash profit of the producers will also increase. However, encouragement is still required so that producers continue the mungbean cultivation and this would be possible as market price is still on the rise and higher input cost has no negative impact on the production (r=-.511, n=533, p=000).

The study further digs into grain selling places and reasons behind choosing the places. It has been seen that around 58 percent respondents preferred to sale grain to wholesale market, 45 percent preferred in
The reasons mentioned to prefer those places for grain marketing were “buy bulk amount” (57 percent), “make immediate payment” and “pay good price” (52 percent each), 40 percent mentioned “not require transportation cost “, and “market located nearby of their home”. However, it has been found that around 21 percent of producers mentioned that they get the lower price than their expectations because of limited buyers purchasing grain from doorsteps (reported by 36% of the producers who said lower price) and 33% of the sampled producers reported to get lower prices because of poor grain quality due to Amphan.

### 2.3.2.2 Technology Adoption

The study found that 100 percent of mungbean producers in 2020 applied at least one improved technology which was 54 percent in 2018. The area under new or improved technology per producer was found to be 0.36 ha per producer in 2020 which was 0.27 ha per producer in 2018. Data show that 96 percent mungbean producers applied improved crop genetics or mungbean variety (BARI 6 and Sona mungbean) and the area under this technology was 0.35 ha per produce. Here, the practice of line sowing and growth hormone application was found very limited, only 9% producers but 59 percent mungbean producers used soil related fertility technologies. It is promising as the study found 55 percent mungbean producers implemented grain and seed contract farming i.e. selling their produce through grain subcontract or hub manager. This contract type of marketing and distribution was promoted by RDC through its partner companies. Traditionally the mungbean cultivation does not require much use of power tiller or tractor, also harvesting was done by hand picking, and therefore a very small percentage of mungbean producers used the mechanization technologies (Annex 3, Table 3.1 and Table 3.2).
2.3.2.3 Sources of Information and Attitudes

Regarding production technology, inputs, and market related information, from the survey it has been found that local farmers, neighbors, or relatives play an important role as around 78 percent respondents used them as one of information resource. Input dealer and retailer were seen very useful information source (mentioned by 8% of respondents) especially in soil related, pest and diseases management and crop genetics aspects. Family members, such as wife also seen active towards information resource particularly in marketing and distribution, and cultural practices. Information was also gathered from training or learning sharing session (7 percent respondents), Business promotional campaigns, such as road show, hat bazar campaign, video, etc. (2 percent respondents).

Focus group discussions with producers also revealed very similar patterns in the case of analyzing existing practices of obtaining information on production technologies and inputs. However, as an effective information source as mentioned by the respondents follow the similar pattern of information sources. Analysis shows that Training and learning sessions was also effective for many of them (around 15%) in addition to the locals and input dealer and retailers.

All most all respondents reported that they will continue to use the adopted technologies in the upcoming seasons and years. Overall, in maize sector, 17% of respondent producers disseminated the technological knowledge to their neighbors’ producers and per producer knowledge or information dissemination rate was estimated at 3 producers.

2.3.2.4 Gender

The gender engagement in mungbean cultivation activities Flyer 2.7) is found that 99 percent respondent reported women involvement in post-harvest management like; threshing, drying, and cleaning activities, 56 percent respondent reported women involvement in harvesting activities, 38% reported on seeding process, and storage activities. Though under this sector, comparatively higher women involvement was seen compare to other RDC promoted crops but in marketing, women involvement was much lesser (16%) and this is one of the areas in mungbean where RDC will need to focus in the financial year.

Data on the decision-making process at different stages of crop cultivation and marketing show that in the case of variety selection, 47 percent respondent reported that the decision was made by only male members, for 50 percent cases consultative discussion between men and women household members.
was taken places before making decision, and 3 percent female members made decision alone and/or discussion with the male members. That 3 percent producers reported decision made by women for grain marketing, crop genetics and soil related fertility and rest of the respondents (97 percent) reported that the male dominates all activities.

In the case of agriculture expenditure and making decision for expenditure from agriculture income shows that same scenario like technology adoption, 97 percent of respondents reported that either husband made decision after getting consent from wife/female members and/or male member took the decision himself. For 56 percent of the 97 percent said husbands made this decision after receiving consent from their wife/female members, while 41 percent of the respondents said male members of the household were solely responsible for this decision. There is clearly still room for improvement in promoting women’s participation in such decision-making processes (Annex 3, Table 3.3 and Table 3.4).

### 2.3.2.5 Amphan and COVID 19 Impact

The study revealed that 82% of mungbean households had a negative impact on household level income and as many as 31% of the survey households reported a decreased remittance inflow due to COVID 19 pandemic. The study did not find any remarkable deviation when segregating data by age, sex and landholding categories.

Despite this natural disaster (Amphan) and global COVID 19 pandemics, the overall agri-farming income as reported by the respondent stands at $1,302 per mungbean producer household in 2020. Data show that producers invested a major portion (29%) of their income to agri-farming, spent 24% for purchasing foodstuff, kept 9% for clothes, 6% to medical treatment, education, household assets, loan repayment, and spent the rest to meet the basic needs and shelter.
Flyer 2.4
SESAME

0.40
Yield (MT) per hectare
51%

0.38
Average area cultivated per producer (ha)
29%

280
Input cost (USD) per hectare
50%

850
Sales price (USD) per metric ton
71%

Yield decreased because of adverse Amphan Impact during close to harvesting stage

90%
Share of sales (MT) in total production
0%

62
Gross margin (USD) per hectare
72%

116
Sales (USD) per producer
40%

Producers applied at least one improved technology
100%

Area (hectare) per producers who applied at least one improved technology
0.37

Procurement
-7%
Decrease in procurement by partner company

Inputs: Seeds and planting material sales
2 MT
US$ 2,298

Inputs: Other non-durable inputs sales

Inputs: Durable equipment's

Services: Business Services

Copying in
- Average 0.73 per producer
- Other producers (average 4.55 per producer)
- Copied technology from 16% producers

Grain sales by producers
5,152 MT
US$ 4,378,303

The gross margin also decreased because of yield damage and quality of grain are also not up to the mark, which leads to low market price.
2.4 SESAME

RDC facilitate this year a total of five interventions (two for quality seed supply and three for export quality grain procurements) with national and regional private partners to ensure supply of improved quality sesame seed to producers and export quality grain procurement from the producers. It has initiated several interventions through its partners towards helping in post-harvest management, which was the key issue for producing export quality grain. The sub-sections below describe the performance results of these initiatives.

2.4.1 Intervention Performance

RDC co-created interventions traded an estimated total business value of $34,39,467, which derived through 1.78 MT quality seeds transaction and 4,560 MT grain procurement in FY2020. [source: RDC LEAP database, business report]. This business enabled 37,890 producers, which includes 448 women and 2,387 youths under 29 years old in sesame crops cultivation, to have access to inputs, services, and end markets. Of these access outreach, 927 producers were reached through supplying quality seeds and 36,963 producers through grain procurement. To reach an outreach in sesame sector, private partners traded that business through their supply or distribution network.

2.4.2 Performance Results

To gain insights of the performance of RDC co-created interventions, 508 producers or small farm holders (producers with less than 5 ha land, USAID definition), were sampled for sesame crop. Of them, 98.8 percent were males and 1.2 percent were female producers. Age-wise classification shows that 6 percent producers were youth of age 15-29 years and remainder (94 percent) were adult, above 30 years. Household classification on land holdings as per Bangladesh Bureau of Statistics (BBS) shows that 33 percent of the sampled producers belong to large farm category, 33 percent to small, 30 percent to medium and only 4 percent of producers fall in marginal farm group. Thus, the majority of sampled producers (63 percent) were representing the small and medium farms producer. One in every five producers have received two or more services and from multiple interventions.

2.4.2.1 Productivity and Returns

As shown in Flayer 2.4 and Annex 2, Table 2.1, the yield decreased to 0.4 MT per ha in 2020 which was 51 percent point lower than the yield of 2017 (0.81 MT/ha). One sample t-test shows a statistically significant difference in per ha mean yield between 2017 and 2020, t(507) = -8.648, p = .000. The study finds that the marginal producers, whose cultivation plot sizes were small, got higher yields (0.79 MT/ha) in compare with small and medium size farming households (0.62 MT/ha). Interestingly large farmer got poor yields, 0.29 MT/ha because of flood or cyclone Amphan. Based on the FGDs with the sesame producers, it was found that most of the large farms belong to char (delta) area, where cultivable land size is high and those areas were badly damaged by Amphan, resulting in a declined average yield.
Data (Annex 2, Table 2.2) show that 90 percent of the total production sold to end markets, 2 percent of production was utilized for household consumption, 3 percent stored for late sales, 3 percent of production shared for labor or harvesting purposes, and 1 percent kept for seed. Despite an increased average market price ($849.85 per MT in FY2020) of sesame grain by 71 percent and at the same time with an increased input cost ($280 per ha in FY2020) by 50 percent, producers were less profitable compared to 2017. Average gross margin per ha decreased by 72 percent from $217.84 in 2017 to $62.5 in 2020. The sales value ($116 in 2020) per producer declined from 2017 by 40 percent. The cash profit per producer also declined sharply from $93.64 in 2017 to $10.29 in 2020. In FY2020 the BCR is almost negligible in compare with last three year for sesame sector. The BCR in FY2020 is 0.22, which was 2.94, 1.01, and 1.17 respectively in 2019, 2018, 2017.

The analysis (Flyer 2.4.2) shows that the cultivation area of sesame per producer decreased in 2020 (0.38 ha/producer) by 29 percent from 2017 but in comparison with 2019 (0.25 ha/producer). The key reason to the increased area under cultivation was the previous seasons profitability. This year producers cultivated more sesame on the assumption of good profitability. This did not happen because of the impact of climatic events depressing yields.

Pearson correlation was done to assess the relationship among gross margin, cash profit, cultivation area, yield and input cost and average market price per MT. There was a positive correlation between gross margin and sales price of rice, which was statistically significant at the 0.01 level (r=.282, n=508, p=000). Yield correlated positively with gross margin (r=.696, n=508, p=000) and cash profit (r=.636, n=508, p=000), which were significant at the 0.01 level. Pearson correlation also showed a positive correlation between cash profit and market price (r=.293, n=508, p=000). Negative correlations were seen between cash profit and area (r=.301, n=508, p=000), and gross margin and area (r=-.234, n=508, p=000). Test suggests that if price and yield increase, the gross margin and cash profit of the producers will also increase.

The study further digs into sesame seed and grain selling places and reasons behind choosing the places. It has been seen that around 41 percent respondents preferred to sale grain to wholesale trader, 29% to different wholesale markets and 55 percent to retail markets. The reasons mentioned to prefer those places for grain marketing were “pay good price” mentioned by 63 percent respondents mentioned, “buy
bulk amount” reported by 50 percent, 45 percent mentioned “make immediate payment”, 35 percent mentioned market located nearby of their home and 2 percent of the producer mentioned “processing company collector”. However, it has been found that around 29 percent of producers mentioned that they get the lower price than their expectations because of poor quality of grain due to Amphan (mentioned by 63% of the producers), less production (40%) and limited traders/farías at the doorstep and hut (market) purchasing the grain (reported by 35% of the producers who said lower price).

### 2.4.2.2 Technology Adoption

In the case of use of improved technology, 100 percent sesame producers were found to practice at least one improved technology which was 64 percent in 2018. In 2020, the area under at least one improved technology was 0.37 ha per producer which was 0.29 ha per producer in 2018. In the case of crop genetics, 99 percent sesame producers used improved black, red, brown sesame variety at an average of 0.37 ha of area per producer in 2020 (Annex 3, Table 3.1 and Table 3.2). Though most of the facilitated interventions on grain procurement for making export market demand, only 21 percent producers applied improved marketing and distribution technology such as grain and seed contract and subcontract farming. The partner company Jadid, Sukumar, Natural Agro collected sesame grain through aggregator or wholesaler, not from producers directly. As a result, in many cases, the producers did not know to which company they were selling their product. A sharp raised adoption trend of post-harvest activities, storage and soil fertility conservation technologies were found by the sesame producers (82%). Also, the cultivation of sesame does not require much use of fertilizer as this plant grows well without soil fertility conservation technologies including fertilizer.

The one-way ANOVA test was done to understand the impact of technology use on yield per ha. From the analysis it was found that there was no significant impact between groups of different level of technology use on yield per ha (F (9, 498) = 1.125, p=.343). Post hoc testing revealed no significant differences between the number of technologies uses by the producers. Existing technology adoption rate suggests that there is room for creating accessibility in climate risk management and mitigation, mechanized harvesting, finance, and end market access.

Around 93 percent of the respondents reported that they will continue to use the adopted technologies in the upcoming seasons and years and it is around 77 percent of producers committed to continue post-harvest management practices, such as drying on polyethylene or pucca floor, and improved stacking-jug. Overall, in sesame sector, 16% of the producers disseminated the technological knowledge to their neighbors’ producers and per producer knowledge or information dissemination rate was estimated at 4.55 producers.
2.4.2.3 Gender

Women were seen involved in post-harvest management and seeding stage, storage and marketing and distribution. Data shows that around 98 percent women involved in post-harvest management, 30 percent found in storage processing, 25 percent found in seeding stage and 13 percent found in harvesting process. Very similar pattern has been seen across the different land-based household categories.

With respect to decision-making in technology adoption, females were involved in variety selection (3 percent), post-harvest management (2 percent), and marketing (reported by 1 percent respondents). On the other hand, male producers were engaged in all these activities - land preparation, seed preparation, fertilizer application, weeding, irrigation, harvesting, transportation and post-harvest activities.

With respect to decision-making in agriculture expenditure, 45 percent of the respondents reported that husband or male made the decision after getting consent from wife or female members, only 2 percent reported that female made decision through discussion with husband or other male members, and 53 percent respondent reported that male member took the decision himself. From that results it is reflected that in decision making for agriculture expenditure, male members took decision either himself alone or through discussion with wife or female member, therefore, there is room for improvement in regard to women participation in decision making process decision (Annex 3, Table 3.3 and Table 3.4).

Further analysis on making decision for expenditure from agriculture income shows a very similar pattern as seen in agriculture expenditure. A little over 53 percent of the respondents reported that male made the decision through getting consent from wife or female members, whereas 45 percent respondents reported male member alone made the decision and about two percent female took decision either alone or consulting with male members.

2.4.2.4 Amphan and COVID 19 Impact

The study revealed that over 67% of the sesame households had a negative impact on household level income and as many as 21% of the survey households reported a decreased remittance inflow due to COVID 19 pandemic.

Sesame production losses due to Amphan/flood at pre-harvesting and post-harvesting periods was also reported by the respondents. Data shows that 84% of the sampled producers had pre-harvesting production losses with an estimated loss was 0.40 MT per loss reporting producer. Analysis shows that 10% of the sesame producers had post-harvesting losses due to Amphan/rain/flood and but negligible in terms of volume.

Despite climate events and global COVID, the overall agri-farming income as reported by the respondent stands at $1,918.43 per sesame producer household in 2020. Data shows that producers invested a bulk-portion (37%) of their income to farming, spent 27% for purchasing foodstuff, 7% for clothing, 6% for medical treatment, and 5 percent for savings or deposit, and the rest of income went to social recreation purposes, loan repayment, and to meet the basic needs and shelter.
Flyer 2.5
SUNFLOWER

2.09
Yield (MT) per hectare

0.16
Average area cultivated per producer (ha)

443
Input cost (USD) per hectare

547
Sales price (USD) per metric ton

65%
Share of sales (MT) in total production

700
Gross margin (USD) per hectare

121
Sales (USD) per producer

Increased Yield because of variety (Hysun 36)

Producers applied at least one improved technology

Area (hectare) per producers who applied at least one improved technology

Seed Sales

61%
Increase in procurement by partner companies

Seed Sales

Inputs: Seeds and planting material sales
1 MT
US$13,982

Inputs: Other non-durable inputs sales
1 MT
US$7,439

Inputs: Durable equipment

Services: Business Services

Copying in
- Average 1.14 per producer
- Other producers (average 7.06 per producer)
- Copied technology from 16% producers

Grain sales by producers
504 MT
US$275,335

Gross margin increased because of sunflower grain quality and market price going to be high, that influenced through gradually increasing market demand. People also in health conscious to intake oil.
2.5 SUNFLOWER

In the sunflower sector, in this financial RDC facilitated only one intervention to quality seed available in the FtF zone, although RDC had facilitated three interventions with processing companies from 2018. Through this study, RDC had the opportunity to see the extent of the producers’ access to market and at the same time RDC was able to assess results of use of quality inputs. This sub-section describes the performance results of these initiatives.

2.5.1 Intervention Performance

Private partners interventions, for helping quality seed supports to producers, were facilitated with an Agribusiness companies (ACI Agro Ltd.) of Bangladesh. Beside seed supply through this intervention ACI supplied bio fertilizer and crop protection product to producers with the aim towards getting higher yield and quality grain with more oil contents.

RDC co-created interventions traded $21,421.44 business value in this reporting year, which derived through 1.37 MT quality seeds and bio/organic fertilizer and CPP products supply in the FtF [source: RDC LEAP database, business report]. An estimated access outreach was 2,271 producers, which includes 69 women and 149 youths under 29 years old in sunflower crop cultivation, who have access to inputs. Of these, 1,434 producers were reached through supplying quality seeds; 837 producers through crop protection products (CPP) and bio/organic fertilizer. To reach an outreach in sunflower sector, partners worked with their dealers and retailers throughout the year.

2.5.2 Performance Results

To gain insights of the performance of RDC co-created interventions, 198 producers or small farm holders (producers with less than 5 ha land, USAID definition), were sampled for sunflower crop. Of them, 97 percent were males and 3 percent were female producers. Age-wise classification shows that 7 percent producers were youth of age 15-29 years and remainder (93 percent) were adult, above 30 years. Household classification on land holdings as per Bangladesh Bureau of Statistics (BBS) shows that 56 percent of the sampled producers belong to small and medium categories, 41 percent in large category; only 2.5 percent producers from marginal group. Thus, the majority of sampled producers were representing the small and medium farms producer.

2.5.2.1 Productivity and Returns

As shown in Flyer 2.5 and Annex 2, Table 2.1, the sunflower yield was 2.09 MT per ha in 2020 which was 56 percent higher than the baseline year 2017 (1.34 MT), Yields were also significantly higher when compared to successive years, mainly attributed to the hybrid seed. One sample t-test shows there is statistically significant difference in per ha mean yield between 2017 and 2020 (p=.000, 95% CI: 0.64-0.84).
According to the producers, the natural disasters (cyclone and high rainfall) caused the crop loss and decreased yield, where 66 percent sunflower producers reported crop loss because of Amphan but not too much like sesame crop.

The study found that male producers produced higher yield (2.1 MT per ha) than female producers (1.6 MT per ha) in 2020 and with respect to age, producers aged above 30-years produced less than the younger (15-29 years old) producers. With higher yields, the gross margin ($) per ha also increased significantly by 110 percent from 2017 to 2020. The increased gross margin was followed by the increased average market price ($) per MT by 2 percent. However, the cash profit per producer increased from $5.54 in 2017 to $49 in 2020. This increase is due to the increased in yield ($) per hectare, not that much increased in input cost per hectare and increased market price in 2020.

Despite, the increased sunflower yield per ha, the average cultivation area (ha) per producer decreased by 8 percent from 2017 to 2020 indicating that because of last year yield and cash profit performance, this year producer cultivated less amount of area. Significant increase of gross margin was resulted by insignificant increased input cost per ha achieved through the application of improved practices by the sunflower producers [source FGDs]. It is worth mentioning here that the producers were directly linked to the partner companies (NCPL and MRT) and received knowledge support through RDC interventions.

Benefit-cost ratio (BCR) also found just doubled in 2020, in compare with last three years’ BCR. Overall, sunflower sector has it’s the best BCR in 2020 (1.58) as compared with 0.80, 0.86 and 0.86 respectively in 2019, 2018 and 2017.

Pearson correlation was done to assess the relationship among gross margin, cash profit, cultivation area, yield and input cost and average market price per MT. There was a moderate positive correlation between gross margin and yield per ha, which was statistically significant at the 0.01 level (r=.778, n=198, p=000). Market Price correlated positively with gross margin (r=.422, n=198, p=000) and cash profit (r=.368, n=198, p=000), which were significant at the 0.01 level. Pearson correlation also showed a positive correlation between area and cash profit (r=.387, n=198, p=000). However, cash profit has a negative between cash profit and per hectare input cost (r=-.326, n=198, p=000). Test suggests that if cultivated area, price and yield increase, the gross margin and cash profit of the producers will also increase.
The study further digs into sunflower grain selling places and reasons behind choosing the places. It has been seen that around 55 percent respondents preferred to sale grain from farm gate or home, 48 percent preferred to sales in wholesale market, and 39 percent preferred to sales in retail or village markets. The reasons mentioned to prefer those places for grain marketing were 69 percent respondents mentioned “make immediate payment”, 52 percent mentioned “buy at farm gate, so not require transportation cost”, 44 percent mentioned “buy bulk amount”, 41 percent mentioned “pay high price”, 22 percent mentioned market located nearby of their home. It has also been found that around 69 percent of producers mentioned that they get expected price, and 21 percent of producers mentioned that they get the lower price than their expectations because of limited buyers (33 percent) purchasing grain from doorsteps, limited supply of product (24 percent) and poor grain quality due to Amphan (11%).

2.5.2.2 Technology Adoption

Analysis on the cultivation practices shows that there is an increasing trend over the years on the use of improved technologies in terms number of producers as the RDC activities progress. It was found from the survey that 100 percent of the sunflower producers applied at least one improved technology in 2020 which was 96 percent in 2018 (Annex 3, Table 3.1 and Table 3.2). The average area under improved technology (at least one) was 0.16 ha per producer in 2020 which was 0.17 ha in 2018.

The mostly practiced technologies (Flyer 2.5.2) in 2020 by sunflower producers were improved crop genetics, practices, marketing and distribution. 100 percent sunflower producers used improved sunflower variety which was Hysun-36 promoted by RDC interventions. This technology was practiced at 0.16 ha per producer. Since the RDC facilitated interventions on output market in the last two years, there has been 46 percent producers who applied improved marketing and distribution technology. Few producers also applied post-harvest handling, storage and soil fertility conservation technology.

The one-way ANOVA test was done to understand the impact of technology use on yield per ha. From the analysis it was found that there was no significant impact between groups of different level of technology use on yield per ha (F (7, 178) = 0.337, p=.936). Post hoc testing revealed no significant differences between the number of technologies uses by the producers. However, mean yield per ha increases as the use of number of technologies increased e.g. mean with two technologies is (M=2.19) and use of seven technologies the mean is 2.24 mt per ha.

Around 86-100% percent of the respondents reported that they will continue to use the adopted technologies in the upcoming seasons and years. Only a negligible percentage will not continue as input costs are perceived to be too high and the performance was not much satisfactory. Overall, in sunflower sector, 16% of the respondent producers disseminated technological knowledge to their neighbor producers and per producer knowledge or information dissemination rate was estimated at 1.14 producers.

2.5.2.3 Gender

The gender engagement in sunflower cultivation activities is shown in (Flyer 2.7). Data shows that 99 percent of the respondents mentioned that women mostly involved in post-harvest management, 43
percent reported involvement in harvesting, 41 percent reported in seeding stage, 43 percent in storage activities, 31 percent reported in selling and marketing activities. So, considering the level of percent of women involvement in all level of cultivation of sunflower, it was reflected that women participation is more in compare with other crops in sunflower.

Data on the decision-making process at different stages of crop cultivation and marketing show that in the case of variety selection, 48 percent respondent reported that the decision was made by only male members through discussion with women, only 2 percent reported women took decision through discussion with men and 51 percent reported that only men took the decision. Same picture saw that for culture practice, pest and disease management, and soil related fertility but for pest and disease management women involvement percentage was found better (5%). In the case of marketing, the study found that 71% men took decision through discussion with female, which was impressive (Annex 3, Table 3.3 and Table 3.4).

With respective to decision-making on agriculture expenditure, and expenditure made from agriculture income shows very similar results, with 45 percent of the respondents reported that husband made decision after getting consent from wife or female members, 53 percent respondent reported male member took the decision himself and a negligible percentage reported that female made decision through discussion with husband or other male members. From that results it is reflected that in decision making for expenditures, male members took decision either himself alone or through discussion with wife or female member, therefore, there is room for improvement in regard to women participation in decision making process.
**Flyer 2.6**

**GROUNDNUT**

- **2.23** Yield (MT) per hectare
- **0.21** Average area cultivated per producer (ha)
- **695** Input cost (USD) per hectare
- **850** Sales price (USD) per metric ton

**Increased yield because of Good Agronomy Practice and quality of seed**

- **72%** Share of sales (MT) in total production
- **1201** Gross margin (USD) per hectare
- **290** Sales (USD) per producer

- Producers applied at least one improved technology: **97%**
- Area (hectare) per producers who applied at least one improved technology: **0.21**

**Procurement**

- **100%** Increase in procurement by partner company

**Inputs:**
- Seeds and planting material sales: 5 MT, US$ 1,260
- Other non-durable inputs sales: 41 MT, US$ 26,696
- Durable equipment
- Services: Business Services

**Copying in**

- Average 0.55 per producer
- Other producers (average 5.52 per producer)
- Copied technology from 10% producers

**Grain sales by producers:**

- 968 MT, US$ 822,276
2.6 GROUND NUT

In the ground sector, in this reporting year RDC facilitated four inputs interventions and one procurement intervention to make available the quality seed and market access in the FtF zone of Bangladesh. So, through this study RDC has the opportunity to see the extent of the producers’ access to market and at the same time RDC was able to assess results of use of quality inputs. This sub-section describes the performance results of these initiatives.

2.6.1 Intervention Performance

Private partners intervention, for helping seed supports to producers, was facilitated with Partex Agro Limited. Besides supplying the quality seeds to producers, there were other interventions with Bayer Crops, NAAFCO, Partex Agro, and Xplore Ltd were also initiated to make quality bio/organic fertilizer and crop protection products available to producers to use in multiple crops (RDC facilitated crops or other crops) cultivation.

RDC co-created interventions traded $159,776 business volume in this reporting year, which derived through 5.1 MT quality seeds, 158.54 MT grain procurement and 41.24 MT bio/organic fertilizer and CPP products supply in the FtF [source: RDC LEAP database, business report]. An estimated access outreach was 2,835 producers, which includes 181 women and 220 youths in ground nut crop cultivation, who have access to inputs. Of these, 218 producers were reached through supplying quality seeds, 266 producers through grain/seed procurement, and 2,351 producers through crop protection products (CPP) and bio/organic fertilizer. To reach an outreach in ground nut sector, partners worked with their dealers and retailers throughout the year.

2.6.2 Performance Results

To measure the performance of RDC co-created interventions, 438 producers or small farm holders (producers with less than 5 ha land, USAID definition), were sampled for ground nut crop. Of them, 94 percent were males and 6 percent were female producers. Age-wise classification shows that 8 percent producers were youth of age 15-29 years and remainder (92 percent) were adult, above 30 years. Household classification on land holdings as per Bangladesh Bureau of Statistics (BBS) shows that 71 percent of the sampled producers belong to small and medium categories, 21 percent in large category; only 8 percent producers from marginal group. Thus, the majority of sampled producers were representing the small and medium farms producer.
2.6.2.1 Productivity and Returns

As shown in Flyer 2.6 and Annex 2, Table 2.1, the yield of the ground nut was 2.29 MT per ha in 2020 which was slightly higher (6.5 percent) than the baseline year 2017 (2.15 MT per ha). One sample t-test shows there is statistically significant difference in per ha mean yield between 2017 and 2020 (p=.000). According to the producers, the natural disasters (cyclone and high rainfall) caused the crop losses and decreased yield, where 29 percent ground nut producers reported crop losses because of Amphan.

The study found that male producers produced higher yields (2.24 MT per ha) than female producers (2.12 MT per ha) in 2020 and with respect to age, producers aged above 30-years produced higher than the younger (15-29 years old) producers. With higher production, the gross margin ($) per ha increased to $255 in 2020 from $109 in 2017. The increased gross margin was followed by the increased average market price ($850) per MT by 28 percent. However, the estimated cash profit per producer in 2020 was $142. This increase is due to the increased in yield ($) per hectare and increased market price in 2020. Despite, the increased ground nut yield per ha, the average cultivation area (ha) per producer decreased marginally from 2017 to 2020 indicating that producer cultivated less amount of area due to lower cash profit in the past. Benefit-cost ratio (BCR) also found increased in 2020 (1.42), in compare with 2017 (0.86).

Pearson correlation was done to assess the relationship among gross margin, cash profit, cultivation area, yield and input cost and average market price per MT. There was a strong positive correlation between gross margin and yield per ha, which was statistically significant at the 0.01 level (r=.706, n=438, p=0.000). Market price also has a positive correlation has also been with gross margin and cash profit. Test supports that if yield and price increase, the gross margin and cash profit of the producers will also increase even with a smaller increase of market price.

The study further digs into ground nut grain selling places and reasons behind choosing the places. It has been seen that around 45 percent respondents preferred to sale grain to wholesale markets either their own locality or distance markets, 42 percent preferred to sale to the retail markets, and 40 percent preferred to sale from farm gate or doorsteps. More local processing companies directly bought ground nut from farmers (10 percent households sold to them) edging out mungbean and other crops.

The reasons mentioned to prefer those places for grain marketing were 68 percent respondents mentioned “make immediate payment”, 50 percent mentioned “buy bulk amount”, 44 percent pays high/good price, and 28 percent mentioned “sale at farm gate, so not required any transport cost”. It has also
been found that around 67 percent of producers mentioned that they got the expected price, and 21 percent of producers mentioned that they get the lower price than their expectations because of limited buyer (68 percent of lower price reporting households) to purchase grain from doorsteps and/or unable to go the market due to coronavirus pandemic, poor grain quality due to Amphan (18%) and lesser production (12 percent) due to Amphan. Data show that around 43 percent ground nut producers had their production losses and 29 percent of households mentioned losses was due to Amphan and/or rainwater.

### 2.6.2.2 Technology Adoption

Analysis on the cultivation practices shows that 97 percent of the ground nut producers applied at least one improved technology from the given technology list for ground nut cultivation in 2020. The average area under improved technology (at least one) was 0.21 ha per producer in 2020 and around 91 hectares of total land brought under the technology used. The mostly practiced technologies in 2020 by ground nut producers were improved crop genetics (adopted by 96 percent of the ground producers), cultural practices (98 percent), soil related (33 percent) and, marketing and distribution, mentioned by 29 percent households (Annex 3, Table 3.1 and Table 3.2). All respondents reported that they will continue to use the adopted technologies in the upcoming seasons and years (except the use of fungicides, although the adoption rate for fungicides was every negligible). Overall, in the ground nut sector, 16% of respondent producers disseminated the technological knowledge to their neighbors’ producers and per producer knowledge or information dissemination rate was estimated at 1 producer.

### 2.6.2.3 Gender

The gender engagement in ground nut cultivation activities is shown in (Flyer 2.7). Data shows that women from all ground nut producing households were involved in threshing, drying and processing. This was flowed by harvesting (42 percent), 26 percent in storage activities, 23 percent at seeding and 17 percent in overall production management. Data on the decision-making process at different stages of crop cultivation and marketing show that in the case of variety selection, 58 percent of the respondents reported that the decision was made by male members, in 37 percent cases men took the decision in consultation with women, only 5 percent of the respondents reported that women took decision following discussion with men or on their own. The higher prevalence of decision making by men in all stages of ground nut cultivation was seen than a consultative decision with women (Annex 3, Table 3.3 and Table 3.4). In the case of agriculture expenditure, a similar pattern was seen - 40 percent of the respondents reported that husbands made decision after consultation with their wife or female members, 55 percent of the respondents reported male member made decisions himself and 4 percentage reported that female made decision through discussion with husband or other male members. On the other hand, in spending money from agri-income shows a better percentage of consultative decision making (70 percent) and in 30 percent cases the decision was made by the male members or husband himself alone. From that results it is reflected that in decision making for expenditures, male members took decision either himself alone or through discussion with wife or female member, therefore, there is room for improvement in regard to women participation in decision making process.
Flyer 2.7: GENDER

Women’s Involvement in Decision Making in Agri-expenditure

Overall
- Women only or Consultation with Men: 46%
- Men Consultation with Women: 54%

Groundnut
- Women only or Consultation with Men: 33%
- Men Consultation with Women: 67%

Sunflower
- Women only or Consultation with Men: 56%
- Men Consultation with Women: 41%

Sesame
- Women only or Consultation with Men: 45%
- Men Consultation with Women: 53%

Mungbean
- Women only or Consultation with Men: 48%
- Men Consultation with Women: 50%

Maize
- Women only or Consultation with Men: 41%
- Men Consultation with Women: 55%

Rice
- Women only or Consultation with Men: 45%
- Men Consultation with Women: 54%

Women Involvement in Agriculture

**RICE**
- Land preparation: 8
- Seeding: 35
- Management: 8
- Harvesting: 18
- Threshing/ Drying/ Processing/ Selling/ Marketing: 19
- Storage: 32

**MAIZE**
- Land preparation: 1
- Seeding: 15
- Management: 1
- Harvesting: 7
- Threshing/ Drying/ Processing/ Selling/ Marketing: 9
- Storage: 32

**MUNGBEAN**
- Land preparation: 38
- Seeding: 2
- Management: 56
- Harvesting: 99
- Threshing/ Drying/ Processing/ Selling/ Marketing: 16
- Storage: 30

**SESAME**
- Land preparation: 3
- Seeding: 25
- Management: 4
- Harvesting: 13
- Threshing/ Drying/ Processing/ Selling/ Marketing: 10
- Storage: 30

**SUNFLOWER**
- Land preparation: 5
- Seeding: 41
- Management: 43
- Harvesting: 99
- Threshing/ Drying/ Processing/ Selling/ Marketing: 31
- Storage: 43

**GROUNDNUT**
- Land preparation: 10
- Seeding: 23
- Management: 17
- Harvesting: 42
- Threshing/ Drying/ Processing/ Selling/ Marketing: 10
- Storage: 26

Women dietary diversity
- <5: 1%
- 5 to 8: 57%
- 9 and above: 42%

Minimum Dietary Diversity: 99%
2.7 GENDER

Gender equality and women’s empowerment remain central tenets for development progress on the continent and half of Bangladesh’s population is made up of women and girls making it crucial for the nation to ensure active engagement of women in economic transformation processes. Under this section, women’s involvement in making decision on the technology practice in crop production, making decision on expenditure in agricultural activities, making decision in the use of income, which is derived from agricultural activities, and women involvement in agriculture activities are described. See food security section for findings related to dietary diversity of women.

Women’s involvement has been seen in decision-making in agricultural activities but dominated by males. One third of the respondents mentioned consultative decision between men and women took place in selecting technologies. The exception was seen in marketing and distribution technology where almost half of the cases women’s involvement has been observed. However, the study found that among 3150 respondents, for variety selection and cultivation 61 percent male took decision himself, 37 percent took decision through discussion with wife or female members, whereas only 2 percent women took decision either herself or through discussion with male members. In many cases, women alone and/or consultation with men while selecting technologies have started to form but uneven. Although the consultative decision between men and women at the household level is wanting in the case of practicing different technologies in crop production, there observed a slow progress.
Agri-farming activities in the FtF zone were predominantly male, as only very lower number of households reported women involvement with few exceptions. As per their opinions, women were mostly involved in post-harvest activities like threshing, deshelling, sorting and bagging. Around 98 percent respondents reported threshing, drying and cleaning activities were performed by female, and other higher percentages of women involvement were found for seedling raising and harvesting (29%) and grain storage (31%). More women from marginal families were engaged in labor intensive activities, such as land preparation (especially in ground nut), storage and harvesting (in mungbean), etc. than relatively land based wealthier families.

Making decision in expenditure from agriculture income shows that women’s participation was visible for 58 percent households having a bigger share by men consultation with women (56%) before making any expenditure. Still men alone took decision in around 42 percent households. Ground nut, sunflower and mungbean producers’ households has relatively higher number women only decisions that the other RDC crop cultivating households.

Slightly lower percentages (little over 46% of households) in consultative decision with women in investing money in agriculture expenditure has been seen compared to making decision in expenditure from agricultural income. More than half (54 percent) of sampled households reported male member make the decision himself. This reflects that decision making in both categories of expenditure, in general male took decision either himself alone or through discussion with wife or members, so there is room for improvement regarding women’s participation (at present around 2% women only decision and one in maize families) in decision making process.

Details data are provided in Annex 4.
2.8 **FINANCE**

From the survey it was found that 30 percent of the producers took loan from different organizations within last one year, where average loan size was around $ 675 per loan receiver and the average loan size per sampled household was $ 203 (annex 5, table 5.1). The average loan size of female producers was 36 percent higher than the male as females get privileges like low interest or interest free loans. Mungbean producers have the highest per producer loan ($277) as well more households received credit (39%).

Insignificant portion of loan (only $0.66) utilized for agricultural purpose. Majority of the respondents (64%) mentioned that the loan was taken for multipurpose. Further analysis on respondent replies to question of main purpose of the loan shows that more than 71 percent households took loan to purchase agricultural input which includes the production management (annex 5, table 5.2). This was followed by maintain family expenditure (45%), purchase assets or land (26) and purchase of agro- equipment (26%).

Analysis on loan types (annex 5, table 5.3) shows that loan was mostly taken as cash loan with an interest (mentioned by 96 percent of the loan taken households) and only 4 percent taken cash loan without interest (4 percent). The producers popularly took loan from the MFIs and NGOs (67 percent) as well as from commercial banks (15 percent). Cooperative/local association/Sanity also enabled finance support for around 11 percent households. Private money lender/Mahajan and other financial were found still active along with Agent Bank/Micro merchant and Aratdar/Trader/Aggregator (annex 5, table 5.4).

Bank/mobile bank account: Data shows that 35 percent of the producers have commercial bank account, and it is higher than last year results (29%). 65 percent of producers did not have any bank account as they did not feel any need for this, and some of the households found it difficult to maintain the bank accounts or bank branches are far away from the household. In compare with male and adult, percent of women and youth with bank account were found lower (annex 5, table 5.5).

Analysis shows that 49 percent of the producers have own mobile bank accounts (DBBL, bKash, Surecash and NOGOD etc.). It is worth noting that
many producers have mobile bank account in two or three mobile banks simultaneously. More youths (63%) have mobile bank accounts than adults and females. Around 63 percent of the respondents mentioned that they can use mobile banking facilities through their own or from other household members mobile bank account and 10% households can use mobile banking service through outsider mobile bank accounts, overall 72 percent of the sampled households have access to mobile banking.

Those who have mobile banking services, 94 percent transacted with bkash, 11 percent used the Rocket mobile bank service of Dutch Bangla Bank Ltd (annex 5, table 5.6). NOGOD service is the third most used (used by 6% households) edging out other mobile banking services (utilization rate found less than one percent except SureCash (1.10%). The reasons behind the use of mobile banking as stated by the households were easy availability of top up and cash-out facilities (mentioned by 59% of the households), 56 percent reported it as quick to conduct transaction, 46 percent mentioned easy to operate, 23 percent reported that incentives are offered sometime and 16 percent users felt that mobile banking is secure. Around 57 percent of users stated that they did not face any challenge using the mobile bank accounts.

The households who faced challenges in mobile banking (43 percent) mentioned service or system downtime, cash unavailability and high service charges. However, use of mobile banking by the sampled households in making payment of purchasing agri-inputs or collecting grain sale money has a long away to go as around respectively 1% and 10% of the households used it.

Ownership of mobile phone: It was found that 98 percent respondent households have own mobile phone; among them 96 percent of the producers used basic mobile phones (not smart phones) as well as 48 percent of them used smart phone (annex 5, table 5.7 and table 5.8). Ownership of smart phone by the respondents is much lower, around 16% though together with owning a basic phone the percentage figure of owning a phone stand at 90%. This suggests that some of the respondents relied upon their family members’ phones.

All producers who use mobile phone mainly used for making and receiving calls. Around 37 percent used of them used the phone for mobile money transactions (bKash/Rocket, etc.), 15 percent used for sending/receiving text messages, 12 percent used their phones for social networking, like Facebook. Interestingly, one in every fourth mobile user producers used the mobile for watching films or training videos. Youth percentages are significantly higher than adults when using the phones on social networks, watching training videos, films, money transfers, text messaging.
2.9 FOOD SECURITY

This section contents the findings of income from agri-farming and expenses made from the agri-income, food consumption at home (during the day and night i.e. 24 hours before the survey took place) by household members and women (15-49 years of age), and access to food (asked with a call period of past 4 weeks from the survey date).

Analysis found that the average per household income was estimated at $1,741 (annex 6, table 6.1). Spend from the income shows that 34 percent of the income utilized again for agri farming, 26 percent for purchasing food, on average 4-6 percent of income was spent for other purposes, like education, treatment, clothes, social events, loan repayment, savings etc. Segregation of households by crops and spending on food shows no major difference from the overall figure, the percentage figures range from 22 to 27 percent. Considering land holding categories, spending income for farming activities found slightly higher (34.9%) for medium and large categories in compare with small and marginal groups (34.4%). Spending from income for household consumption found higher for marginal group (31.7%) in compare with other three groups (23.4%). Data shows that the large producers sold more volume of rice compare with small and marginal producers. On the other hand, small and marginal producers consumed more rice from their own production compare with large and medium producers. Crop production distribution also shows that 23 percent (21.64% in FY2019) of cultivated rice/grain is utilized for household consumption. So, considering above statement, marginal and small producers spend their income for food consumption more also major portion of rice production utilized for household consumption.

The study looked at three dimensions of food insecurity: first, anxiety and uncertainty about the household food supply; second, insufficient food intake, and third, household food insecurity with adjusting quantity of food (annex 6, table 6.2 to table 6.6). Data shows that out of 3150 respondents, only 3 percent households reported that they would not have enough food in previous month (from the survey date), 9 percent reported rarely (once or twice in the past four weeks) would not have enough food, and most of them (86%) reported have enough food. Considering land based wealthier category, marginal families were found worse of situation in terms of anxiety and uncertainty of food supply, which was around 37 percent. Ownership of farmland is associated with a reduction, but not complete protection from food insecurity, with 16%, and 9%, and 13% of households in small, medium, and large land-holding categories respectively reporting concerns about lack of sufficient (anxiety and uncertainty) food supply.
Under food insecurity access because of resource constraints condition found that 9 percent respondents reported that their households would not have enough resource to purchase food in last four weeks, therefore was no food eat. No food of any kind in the household results shows a very similar pattern of anxiety and uncertainty when the study considers the land holding classification. Data shows that 30 percent of marginal producer households would not have enough resources to purchase food, 10 percent for small producer households, 5 percent for medium producers, and 7 percent for large producer households.

Analysis on the prevalence of insecurity access to food based on domains and conditions shows that 9 percent of the sampled households were severely food insecure and 2.41 percent were mildly food insecure.

Regarding annual food consumption, data show that overall around 30 percent of households reported cutdown in the quantity of food consumption compare with last year, 48 percent reported the same as last year and 22 percent reported they consumed more food compare with last year. The high proportion of marginal households reporting decreased annual consumption (49%) as compared to all other land-holding households may indicate that they are more susceptible to changes in food availability and affordability than households with larger land holdings. There was a gradual decrease in the percentage of households who cutdown the food intake as the households own more lands.

In addition to the food insecurity access prevalence, the study also collected data on the household dietary diversity to understand the nutrition intake of household members especially for women. In case of household dietary diversity, analysis shows that 54 percent of the households ate five to eight food items and 45 percent ate above nine food items for their meal.
Women’s diets were largely adequate in terms of food group diversity as well. Among women aged 15-45 years, 57 percent of them had five to eight food items and 42 percent of them had above 9 food items in their meals (annex 6, table 6.7). So, the calculated minimum dietary diversity for women was 69.64 percent, and they are more likely to have higher (more adequate) micronutrient intakes than the 30.36% of women who did not”. The average mean of food item groups for women dietary diversity was 9 (n=3150). This can be considered a positive situation for women and future generations.

The findings show that most producer households can meet their food needs in terms of accessibility, resource ability and quantity as because of income increased through RDC interventions facilitation, which helps to get better price, more yield and reduce production cost. However, more balanced and nutrient-rich diet choices can be emphasized in the future.

3. KEY LEARNINGS

3.1 System Analysis

➢ Market System Analysis: Effective facilitation approaches require analyzing root causes of sector-specific constraints and identifying the most viable leverage points for change. Although RDC has done some of this initially, the analyses should continue to be conducted as market dynamics change. In particular, future programming should incorporate regular stakeholder consultations (broader than partner firms), ensuring feedback from key stakeholders and ensuring buy-in to gender and social inclusion and improved nutrition.

➢ Market Facilitation Approach: Lead firms require facilitation and assistance in understanding market constraints and opportunities to be addressed in the FTF zone. RDC can invest resources in conducting field research and sharing findings with the private sector in order to jointly design innovative and inclusive business models that could potentially benefit large numbers of beneficiaries. However, pilot interventions and business models that are facilitated by donor projects are usually controlled by different divisions of private companies, which are separate from mainstream business departments. It is important to drive these interventions through mainstream business strategies in order to achieve the greatest efficiency and establish sustainability.

3.2 Co-creation

➢ Collaboration with market actors during design and implementation: To increase buy-in and accountability of interventions, RDC has placed continuous emphasis on the co-creation process, ensuring alignment and opportunities that allow a business to do something it would otherwise not be able to do. Key to this approach is obtaining innovative ideas from businesses rather than trying to impose ideas on them and assessing capacities and incentives to undertake these activities. Proposed interventions should address a root cause from the market analysis and also contribute to the projects systemic change objectives.
3.3 Scaling Innovative Business Models

3.3.1 Procurement Business Models

Through procurement related interventions, it was observed that grain selling or buying was not the main constraint, but it was an emphasis on quality concerns.

- **New channel creation** such as aggregation or contract farming can’t perform sustainably against established procurement channels. Future interventions should consider a mix of existing/new channels and seek to understand the extent to which these channels create opportunities for rural farmers. A prerequisite for the establishment of a new channel is the ability to incentivise delivery—either through a premium paid for the crop/quality or incentives such as access to discounted inputs should requisite volumes be delivered.

- **Established channels** may be weak or informal but are necessary to create opportunities for farmers and as entry points into new sectors. There are opportunities to enhance efficiencies in established channels though.

- **Contract farming** is appropriate for the initial stages of a sector (e.g. Seed, Zinc Rice or Sesame) or for procuring a specific quality of grain, but is not applicable for most of the sectors or interventions with which RDC works in. Innovative business models that increase the quantity and quality requirements of buyers should be considered. Premiums paid for volume/quality deliveries can bring about change.

3.3.2 Input Business Models

Farmers’ focus remains on the price of inputs rather than quality or yield benefits. The introduction of low-cost bio-remedies (Trichoderma and Inoculant) that improve yields significantly have a relatively slow uptake as there is a general resistance to new technologies and an added cost layer. However, when these inputs obtain a degree of scale and producers are able to see or hear about the benefits from other farmers, uptake increases significantly.

- **Push selling by Dealers/Retailers** is one of the major constraints for quality product marketing, where non-branded companies offer higher commissions to dealers/retailers as they do not carry an advertising/branding overhead. Quality product price points are comparatively higher and offer reduced margins to the dealers/retailers. They do however perform better and generally the amount extra paid is recovered from increased yields. RDC can focus more on brand loyalty, business behaviors, ethics and norms, which may create long term business opportunity with targeting supply and distribution networks.

- **Closer collaboration between research institutions (BRRI, BARI, IFPRI, ICRISAT, CIMMYT etc.) and private firms should be encouraged.** Firms are often unaware of the advances these institutions have made in terms of seed development, crop nutrition and crop protection, which they could well take up and commercialize.

- **Provision of advisory services alongside input supply** is one of the best ways to create loyal customers and enhance sales. Embedded services accelerate business growth. With advances in the use of ICT and social media platforms, this becomes relatively easy to do and at a low cost. Embedded
advisory services presents a major market opportunity for businesses to increase profitability and for RDC to increase its farmer outreach numbers.

3.4 Engaging with Diverse Partners

One of the reasons RDC has been able to work across so many interventions and achieve its scale and development impact is due to its focus on a portfolio approach which diversifies the size and type of market actor. The size of the company does not necessarily correspond with how successful an intervention is.

3.4.1 National or Large Company

Interventions with National/Large companies are easily scalable due to their resources and ability to manage larger activities. However, these companies are frequently less adaptive due to bureaucracy in decision making processes and development interventions not always aligning with their core business strategies. Large firms are also frequently compartmentalized and take a silo like approach rather than leveraging synergies between divisions.

3.4.2 Regional or Small Company

Interventions with regional/smaller companies indicate a willingness and enthusiasm to try new strategies and obtain results. They are more adaptive due to flatter management structures resulting in less bureaucracy in decision making processes. The companies are responsive and flexible. However, there is less opportunity to scale because of limited resources, company footprint and management capacity. These companies do have an important role to play in terms of piloting innovative approaches that can be learned from, replicated and scaled. Their local engagement and standing within communities are positive factors that can be leveraged. The firms are also more open to considering joint ventures and collaboration with other firms as we have seen particularly when linking companies to the banks and mechanization firms.

3.5 Monitoring, Evaluation and Learnings

Private Sector led MEL system should be developed in the design phase of interventions to ensure accountability and ownership. This process will help private partners to set up and review the intervention objectives during the design phase and discuss how private partners can benefit from evidence and learning. This will also increase private sector actors’ ownership and value of project data, leading to more sustainable and scalable interventions. This data will also inform the projects adapt, adopt, expand and allow it to tailor interventions based on market dynamics.

Ensuring Links to Households: RDC’s interventions have proven to impact household productivity and incomes. However, more emphasis needs to be placed on how these facilitative interventions are also increasing household food security and nutritional outcomes. This will be done through developing a results chain for each intervention, which should be led by the private partners, to make them accountable and understand how the proposed activities contribute to household productivity, income and food security.
ANNEXES – ANALYSIS TABLES OF ANNUAL PERFORMANCE SURVEY

PDF
FY2020 APS Analysis
Tables.pdf