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Impact assessment of integrated farming at farming system research site

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Abstract

The study was initiated at FSR site Narikeli, Jamalpur to assess the impact of the technologies given to the FSR sites of OFRD of BARI. The findings of the study suggested that the recommended technologies were profitable. MBCR was found to be greater than two for all the recommended technologies. Technologies like crop production, homestead farming, livestock and fisheries also created employment opportunity to the family members. The overall SPIS was found to be 78.33 percent indicating overall change in socio-economic status of the sample farmers. The adoption of BARI technologies varied from medium to very low level.

Keywords: Impact, Integrated Farming, Adoption

Introduction

Unlike western farmers a typical small and marginal farmer of Bangladesh obtains his livelihood by applying available technologies and inputs on his farm resources. He has a parcel of land to grow crops and vegetables, a homestead to reside and to use as the center of many activities, a pond or ditch for pesiculture and domestic uses, a variety of different farm implements and livestock to use in farm operations. In this context, Bangladesh Agricultural Research Institute (BARI) has developed some effective mechanisms known as integrated farming through Farming System Research and Development (FSRD) activities to integrate all the above mentioned resources of a farmer in such a way that can derive maximum benefit out of this effort.

Most of these technologies have been disseminated in the farmers' field through different extension agents as well as through the technology village approaches, Multilocation Location Testing Sites and FSR sites of On Farm Research Division, BARI and scientists personal contract. The rate of adoption and impact of these technologies should be assessed in the farmer's levels in terms of increases or decreases in yield, income and employment generation. But there is a dearth of this kind of study. So, the present study was therefore, aimed to determined the extend of adoption of intervened technologies and to evaluate the impact of these technologies on yield, return, income, employment generation and socio-economic development of the farmers.

Materials and Methods

The study was conducted at FSR site Narikeli, Jamalpur during March-May, 2007 to assess the impact of these technologies at farm level. The necessary information were collected with the help of pre-designed and pre-tested interview schedules. Fifteen farmers were brought under the whole farm intervention at the site during the year 1999. All of these fifteen farmers were selected as the sample for the present study. The collected data were summarized and analyzed through tabular methods using averages, percentages, ratios, etc. Raw data were inserted in computer using the concerned software MS Excel. Gross return of each technology was calculated by multiplying the yield with their unit price. Gross margin (GM) is the difference between gross return (GR) and total variable cost (TVC). Marginal benefit cost ratio (MBCR) is the ratio of marginal benefits over costs. It evaluated among several alternatives, the pattern or practice that is most likely to replace an existing pattern or practice.

The level of adoption was measured by computing adoption scores for recommended technologies. Score given to each technology that varied from 1 to 4 according to the adoption of the suggested technology. A respondent farmer could get a score of 4 for adopting cent percent of technologies. On the other hand, farmers could receive a score of 3 for 75% adopting, 2 for 50% adopting and 1 for 25% adopting (Hossain, 1997). The mean score became the index of level of adoption of the recommended technologies. On the basis of the score that earned by the farmers were categorized as high, medium, low and very low adopters respectively. Perceived Impact Score (PIS) technique was used to highlight overall impact of technologies. PIS was computed for each changed item by summing the weights for responses of all the sample farmers against that change item (Khatun, 1999). The weight assigned was 3, 2, 1 and 0 for the selected categories of changes respectively. In order to make a meaningful comparison of data, the PIS for a particular change item was standardized (SPIS) by using the following formula;

$$SPIS = \frac{\text{Observed perceived impact score}}{\text{Possible perceived impact score}} \times 100$$

Results and Discussion

Impact of Intervened Technologies in FSR site on Yield, Returns and Income

Crop Component Technologies: This section analyzed the impact of crop component technologies applied in three period of time namely before intervention (1999-2000), last year of project period (2004) and present situation (2006). The farmers followed the same cropping pattern (Boro-Aman-Fellow) during the different time period but they cultivated high yielding varieties like BRRI dhan 29 (Boro) and BR 11 (Aman) instead of local variety during project period and after project due to higher return. The total gross return and gross margin were Tk 17484 and Tk 8474 before intervention (Table 1). In the last year of project period (2004), the gross margin was 26646 which was 214.44 percent higher than that of before intervention due to the intervention of new technologies. It was also revealed from the table that at present the gross margin was 203.72 percent higher than before intervention but lower than the project period. This indicated that after the withdrawal of the project farmers were found reluctant to adopt the package of technologies as recommended. MBCR were 2.61 and 2.53 during the two time period namely last year of project period (2004) and present situation (2006) respectively taking before interventions period (1999-2000) as a base year (Table 1).

Table 1. Impact of Intervened Technologies in terms of Yield, Returns and Income of Crop Component

Item	Before intervention (1999-2000)	Last year of project period (2004)	Present situation (2006)
Yield (t/ ha)	6.95	9.18	9.0
GR (Tk/ ha)	35682	102237	100486
TVC (Tk/ ha)	18388	47857	47959
GM (Tk/ ha)	17294	54380 (214.44*)	52527 (2036.72*)
MBCR	-	2.61	2.53

* Indicates the percentage increase of GM in compare to the base year (1999-2000)
GR = Gross return, GM = Gross margin, TVC = Total variable cost

Homestead Farming Component Technologies

Utilization of the homestead resources were very minimum as such output in the homestead vegetable production system was also very little before intervention of the project. A good number of crops like white gourd, sweet gourd, indian spinach, turmeric, zinger, bottle gourd, potato yam and other vegetables in the homestead vegetables model were introduced in the homestead production system during project period. Table 2 represents the impact of introduced technologies in case of homestead farming among the three different time period. In the last year of project period (2004), the gross margin was Tk 2446.33, which was 657.21 percent higher than that of before intervention period due to the intervention of different new technology. It was also revealed from the table that at present the gross margin was 971.96 percent higher than that of before intervention period. It was evident from the Table 2 that MBCR for project period varied from a minimum of 3.58 to a maximum of 12.94 and MBCR for present situation varied from a minimum of 2.71 to a maximum of 11.55, which ensure the profitability of adopting new technology.

Livestock and Fisheries Component Technologies

For livestock and poultry almost no technology beyond usual management was used before intervention of new technologies. Intervention imposed dewarming, UMS diet, vaccination and feeding for cattle and poultry. The intervention increases the gross margin by 206.55, 1325.95 and 233.77 percent for cattle, poultry and fisheries sub sector respectively during the project period (Table 3). The gross margins of present situation for livestock and fisheries sub sector were lower than the project period due to the lack of adoption of recommended technologies. The MBCR was found to be greater than two for all the sub sectors during the last year of project period (2004) and present situation (2006) respectively, taking before intervention period (1999-2000) as a base year.

Impact of Integrated Farming on Employment Generation

It was revealed from the table 4 that sample farmers were using 22.65 and 15.89 per cent of more labour in kharif 2 and rabi season respectively than that of before intervention period. The table also indicated that livestock, fisheries and homestead component create employment opportunities to the family members. These components were using 215.20, 73.5 and 186.13 percent of more family labour respectively in the project period and 186.04, 63.5 and 150.94 percent of more family labour in the present situation than the period before project intervention.

Other Socioeconomic Impacts of Integrated Farming

This section describes the impact of integrated farming in respect of 8 different indicators. Percentage distribution of the sample farmers according to their impact of integrated farming perceived in the 8 selected indicators has been shown in the Table 5. Data contain in the Table 5 indicate that proportion of the farmers indicating for excellent change constituted in minimum of 20 percent to maximum of 80 percent, minimum of 6.67 percent to maximum of 33.33 percent for moderate change, minimum of 13.33 percent to maximum of 46.67 percent for average change. No change constituted 13.34 percent in case of education.

Table 2. Level of Technologies Intervened in Homestead Farming in Different Time Period (farm/year)

Resources	Average area (d)	Before intervention (1999-2000)				Last year of project period (2004)					Present situation (2006)			
		Pattern used	Yield (kg)	GR (Tk)	GM (Tk)	Pattern used	Yield (kg)	GR (Tk)	GM (Tk)	MBCR	Yield (kg)	GR (Tk)	GM (Tk)	MBCR
Open field	1.03	Not cultivated	-	-	-	Homestead model	62.22	583.33	459.33	4.70	93.33	788.00	638.00	5.25
Roof	1.10	white gourd	19.13n	145.87	111.67	Sweet gourd, White gourd	28.67n	510.00	447.67	12.94	53.33n	476.00	392.67	6.71
Trellis	0.67	Bottle gourd, sweet gourd	25.67	285.53	211.40	Snake gourd, Bitter gourd, Cucumber, Pointed gourd	59.40	552.67	404	3.58	35.33	507.33	351.53	2.71
Fence	0.17	-	-	-	-	Ridge gourd, Bitter gourd	5.33	64.67	50.67	4.61	-	-	-	-
Partial shady area	1.33	-	-	-	-	Turmeric, Ginger, Mukhi kachu	41.80	455.33	351.33	4.37	21.00	550.67	430.67	4.58
Waste land	1.00	-	-	-	-	Kachu	24.67	163.33	126.67	4.45	13.47	402.00	345.33	7.09
Pond bank	1.00	-	-	-	-	Bottle Gourd, Bari Shim1, White Gourd	36n	130.00	100	4.33	19n	196.67	156.00	4.83
Tree support	2n	-	-	-	-	Potato yam	32.33	368.67	303.33	5.64	28.33	666.67	609.00	11.55
House boundary	1.13	-	-	-	-	Banana, jack fruit, Betel nut	20n	253.33	203.33	5.06	24n	600.00	540.00	10
Total				431.4	323.07			3081.33	2446.3 (657.21)			4187.34	3463.2 (971.96)	

Note: Number within the parentheses indicates the percentage increase of GM in compare to the base year (1999-2000), n indicates number

Table 3. Impact of Intervened Technologies in terms of Yield, Returns and Income of Livestock and Fisheries Component (farm/year)

Resources	No/ Area	Before intervention (1999-2000)			Last year of project period (2004)					Present situation (2006)				
		Technology used	GR (TK)	GM (TK)	No/ Area	Technology used	GR (TK)	GM (TK)	MBCR	No/ Area	Technology used	GR (TK)	GM (TK)	MBCR
Cattle	.53	Traditional feeding	2850.0	1656.67	.80	Dewarming, UMS diet	7240.00	5078.57 (206.55)	3.19	.67	Dewarming, UMS diet	7000.00	3966.67 (139.44)	2.17
Poultry	2.87	No vaccination	400.13	278.13	11.4	Vaccination and feeding	5331.00	3966 (1325.95)	4.17	4.27	Vaccination and feeding	1546.67	1250 (349.43)	6.56
Fisheries	.73d	Traditional practice	833.33	513.33	2.6d	Mixed culture	2431.33	1713.33 (233.77)	4.30	2.2d	Mixed culture	947.33	587.33 (14.41)	2.85

Number within the parentheses indicates the percentage increase of GM in compare to the base year (1999-2000)

Table 4 Employment Generation in Integrated Farming (Man-day)

Component	Before (1999-2000)			Project period (2004)			Present (2006)			% Change Change	
	Own	Purchased	Total	Own	Purchased	Total	Own	Purchased	Total	PP	PS
Crop: Kharif 2 Rabi	7.07 7.80	17.47 20.07	24.54 27.87	7.07 8.20	19.09 22.00	26.16 30.20	8.60 7.80	21.50 24.50	30.10 32.30	6.60 8.36	22.65 15.89
Livestock	4.80	-	4.80	15.13	-	15.13	13.73	-	13.73	215.20	186.04
Fisheries	2.00	-	2.00	3.47	-	3.47	3.27	-	3.27	73.50	63.50
Homestead	10.60	-	10.60	30.33	-	30.33	26.60	-	26.60	186.13	150.94

Note: PP= Project period, PS= Present situation

Table 5. Socio-economic Impacts of Integrated Farming

Items	Nature of changes (%)				Total
	Excellent	Moderate	Average	No change	
Social status	80.00	20.00	-	-	100
Health condition	73.33	26.67	-	-	100
Improved environment	80.00	6.67	13.33	-	100
Food habit	53.33	26.67	20.00	-	100
Life style	66.67	13.33	20.00	-	100
Education	20.00	33.33	33.33	13.34	100
Savings	33.33	20.00	46.67	-	100
Loan repayment	40.00	26.67	33.33	-	100

Table 6. Impact of Integrated Farming on the Basis of PIS

Item	PIS	SPIS	Percentage	Rank
Social status	42	93.33	14.89	1
Health condition	41	91.11	14.54	2
Improved environment	40	88.88	14.19	3
Food habit	35	77.77	12.41	5
Life style	37	82.22	13.12	4
Education	28	62.22	9.93	7
Savings	28	62.22	9.93	7
Loan repayment	31	68.88	10.99	6
Overall SPIS	78.33			

Note: PIS = Perceived impact score, SPIS = Standardized PIS

The overall SPIS of 8 different indicators was found to be 78.33 percent (Table 6) indicating the overall change in socioeconomic status of sample farmers increased by 78.33 percent after involved in the programme. Table 6 also indicates that highest observed SPIS was 93.33(14.89 percent) for social status while the lowest was 62.22 (9.93 percent) for education and savings.

Level of Adoption of Intervened Technologies

In order to determine the level of adoption, the respondent farmers were classified into 4 categories based on the mean scores of the farmers in respect of technologies given in each sub sector. The mean scores and adoption categories have been furnished in the Table 7. The highest score was found in crop sub sectors (2.0) which indicate medium level of adoption. The scores for fisheries, livestock, homestead and poultry sub sector were 1.60, 1.46, 1.0 and 0.67 respectively indicating low to very low level of adoption.

Table 7. Adoption Level of Intervened Technologies Used by the Sample Farmers in Different Sub Sector

Sub Sector	Weighted score (N=15)	Mean score	Adoption level
Crop	30	2.0	Medium
Homestead	15	1.0	Low
Livestock	22	1.46	Low
Poultry	10	0.67	Very low
Fisheries	24	1.60	Low

Note: Adoption level was categorized for mean score ≥3 as high, ≥2 as medium, ≥1 as low, ≤ 1 as very low

Conclusion and Recommendations

On the basis of the findings it can be concluded that the cultivation of BRRI Dhan 29 and BR 11 instead of local variety increases the income of the farmers. Homestead farming, livestock and fisheries components not only met the family consumption and improved nutrition but also create employment opportunities to the family members. This Programme also improved the socio-economic status of the sample farmers. Level of adoption was found to be in lower side. Farmer got some facilities like seeds of improved variety of vegetables, treatment facilities for livestock with free of cost in the project period. But at present they did not continue with these recommended technologies due to lack of such facilities. Based on these findings the following recommendations can be followed:

- Proper extension and training programme should be taken on continuous basis to encourage the farmers for adopting these technologies.
- Seed of improved variety BARI vegetables should be make available to the farmers with minimum of cost. This will help the farmers to get maximum benefit from their available resources.
- Proper inspection and improved monitoring is also recommended.

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