Yield Disparity and Food Security of Marginal Farmers in Basail Upazila of Tangail District

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Abstract

This study examines the food security status of marginal farmers of a village under Basail Upazila in Tangail district of Bangladesh. A commercial profitability analysis, Cobb-Douglas production function and Logit model were employed to achieve the objectives. Primary data were collected from randomly selected 40 marginal farmers and also focus group discussions were made to collect relevant information from a group of 15 well-to-do farmers. The study confirms that marginal farmers obtained much lower per hectare yield of MV Boro (4940 kg/ha) due to financial capital constraint than the yield of well-to-do farmers (6175 kg/ha). In other words, there was a disparity of 1235 kg in producing MV Boro rice between marginal farmers and well-to-do farmers. The coefficients of Cobb-Douglas model exhibit the importance of key variables to the production processes of MV Boro. Since the marginal farmers were operating in increasing return to scale (Stage I), there is an ample scope to produce more MV Boro rice in their plots. The price hike of cereal in 2008 has had a positive impact on MV Boro rice production, but negative impact on household food consumption.

1. Introduction

The food security is a core issue in the struggle against poverty. Given that a larg population is under the lower poverty line one cannot address poverty reductic without addressing food security, particularly for the hardcore poor. In 2007 an

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2008, the increase in prices of basic food commodities and fuel exposed the poorest segments of society to a severe pressure. Food expenditures are increasingly dominating household budgets, the poor are consuming even less than ever before and the quality of their diet has deteriorated further. It is often argued (Mandal 2007) that land available for crop cultivation has been shrinking at around 1 percent per annum, which meant a reduction of average farm size from 0.81 ha in 1983/84 to 0.61 ha in 1996 and further to 0.49 ha in 2005 with concomitant increase in fragmentation and sub-division of holdings. The number of marginal farmer (less than 1.0 acre of cultivable land) has, therefore, been increasing at alarming rate day by day in rural Bangladesh. As a consequence, food security for these people has become a very challenging task.

Despite the growth of food production and its availability, food insecurity is still a major problem mainly because of the lack of purchasing power and thus of access to food. A major portion of the rural population is marginal farmers, they depend on casual earning for their livelihood. Due to the seasonal variation in agricultural employment and limited employment opportunities in non-farm sector, millions of people suffer from chronic and transitory food insecurity. Dillon and Hardaker (1993) rightly pointed out that these people are living truncated lives, suffering from diseases and malnutrition. Some of them have no roof to cover their heads, no clothes to cover their bodies and no means, either to produce or buy the food they need for the bare sustenance of themselves and their families. In Bangladesh, no systematic empirical study has yet been conducted on the impact of price hike on profitability of MV Boro rice production and food security of marginal farmers. The present study has, therefore, been designed to assess profitability, yield disparity and food security status of marginal farmers. The findings of the study may to the policy makers for formulating appropriate food policy for the country.

After this introduction, Section 2 outlines the research methods that have been followed. Results of the study on persnted in Section 3, and conclusion, policy implications of the paper in Section 5.

2. Research Methods

2.1 Study area and sample size

To reduce travel costs, a single study area with uniform topographical and ecological characteristics was considered for the study. Accordingly, village Mirikpur having a large number of marginal farmers, in Basail Upazila of Tangail district was purposively selected for the study. The study area was one with typical low-lying farms growing mainly irrigated MV Boro rice from mid January to mid May.

The marginal farmers having less than and/or equal to 1.0 acre (i.e., 0.4 ha) of cultivable land, and well-to-do farmers having more than 2.0 ha land were considered. Only 40 marginal farmers were randomly selected for the study. A focus group discussion was also held for collecting some relevant information from rich farmers.

2.2. Analytical Technique

2.2.1 **Profitability analysis of MV Boro rice**

To assess per farm (0.19 ha) and per hectare profitability of MV Boro rice production, the net return or profit (?) was calculated using following algebraic equation:

$$\pi = P_Y.Y - \sum_{i=1}^{n}\left(P_{X_i}.X_i\right) - TFC$$

Where,

π = Net return (Tk/ha)

P_Y = Per unit price of the product (Tk/kg)

Y = Quantity of the product per hectare (k g)

P_{X_i} = Per unit price of i - th inputs (Tk)

X_i = Quantity of the i-th inputs per hectar e (kg)

TFC = Total fixed cost (Tk)

i = 1. 2. 3. ..., n (number of input).

Estimations of costs and returns of MV Boro. The production costs of MV Boro rice from the viewpoint of marginal farmers include the cost of all inputs such as: human labour (both family supplied and hired), power tiller, fertilizers, insecticides, irrigation water and interest on operating capital. Farmers used both home supplied and purchased inputs. The determination of the cost of purchased inputs was a straightforward. The cost of these inputs was calculated on the basis of actual prices paid by the farmers in the locality and that of home supplied inputs was determined by employing the opportunity cost principle of the concerned inputs. Similarly, per hectare total return of Boro was determined by multiplying its total main-product (paddy) and by-product (straw) by their respective per unit farm-gate prices.

2.2.2 Functional analysis

The Cobb-Douglas production function model has been chosen to estimate the contribution of inputs used in MV Boro production of marginal farmers. In this analysis, gross return was considered as 'dependent variable' (see Islam *et al.* 2007). Consistency of the double log model to the theoretical concepts of agricultural production makes the applicability of the model more reliable. A multicollinearity test was performed to predict the correlation among the incorporated independent variables in the model.

If we consider gross return from Boro paddy depends on seven factors then the model specified as follows:

$$Y_i = a X_{1i}^{b_1} X_{2i}^{b_2} X_{3i}^{b_3} X_{4i}^{b_4} X_{5i}^{b_5} X_{6i}^{b_6} e^{U_i}$$

$$\ln Y_i = \ln a + b_1 \ln X_{1i} + b_2 \ln X_{2i} + b_3 \ln X_{3i} + b_4 \ln X_{4i} + b_5 \ln X_{5i} + b_6 \ln X_{6i} + U_i$$

Where,; Y = Gross return (Tk/ha)

$\ln a$ = Constant or intercept of the functi on:

X_1 = Human labour cost (Tk/ha);

X_2 = Tillage cost (Tk/ha);

X_3 = Seedling cost (Tk/ha);

X_4 = Fertilizer cost (Tk/ha);

X_5 = Irrigation cost (Tk/ha):

X_6 = Insciticides and pesticides cost (Tk/ha);

$b_1, b_2, ... b_6$ = Coefficients of respective variab le

ln = Natural logarithm:

e = Base of natural logarithm;

U_i = Error term:

i = 1, 2, 3, ..., n .

2.2.3 The Logit Model

The Logit model, was chosen to determine factors affecting food security. Six explanatory variables, five measured as continuous variables and one as discrete variables were identified to be major determinants of food security in this study. These include household income (X_1), price of rice (X_2), cultivable land (X_3), household size (X_4), per capita production (X_5), involvement in non-farm activities (X_6).

The model used in this study to determine factors affecting food security is given below:

For ease of exposition, we write (1) as

Where, p_i stands for the probability of household i being food secure,

$$P_i = E\left(Y_i = 1 / X_i\right) = \frac{1}{1+e^{-(\beta_0+\beta_1 X_{1i}+...+\beta_6 X_{6i})}} \qquad ---(1)$$

$$P_i = \frac{1}{1+e^{-Z_i}} = \frac{e^{Z_i}}{1+e^{Z_i}} \qquad ---(2)$$

y_i is the observed food security status of household i,

$x_i1i\, x_{2i}, \ldots x_{6i}$ are factors determining the food security status of household i

$\beta_1, \beta_2, \ldots \beta_6$, stand fro parameters to be estimated; and

Now the probability of a household being food insecure is given by $(1-p_i)$ which

$$Z = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_6 X_{6i}$$

gives Equation (3)

$$\left(1 - P_i\right) = \frac{1}{1+e^{Z_i}} \qquad --- \quad (3)$$

Therefore the odds ratio, i.e., $\left(\frac{P_i}{1-P_i}\right)$ is given by equation (4) as

$$\left(\frac{P_i}{1-P_i}\right) = \frac{e^{Z_i} \big/ 1+e^{Z_i}}{1+e^{Z_i}} = e^{Z_i} \qquad --- (4)$$

The odds ratio is the ratio of the probability that a family is food secured to the probability that it is insecure.

$$Ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + ... + \beta_6 X_{6i} + U_i \qquad --- (5)$$

The natural logarithm of Equation (4) gives rise to Equation (5)After estimating the Logit model with the help of SPSS package of 11.5 versions, the conditional

$$P_i = \frac{e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_6 X_{6i}}}{1 + e^{\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_6 X_{6i}}} \quad \text{--- (6)}$$

probabilities can be computed from Equation (2) as

Once the conditional probabilities have been calculated for each sample household, the "partial" effects of the continuous individual variables on household food security can be calculated by the expression

$$\frac{\partial P_i}{\partial X_i} = P_i(1 - P_i)\beta_i \quad \text{--- (7)}$$

3. Results and Discussion

3.1 Results of profitability analysis of MV Boro

The results presented in Table 1 clearly indicate that MV Boro cultivation from the viewpoint of marginal farmers was profitable. In fact, per farm profit of marginal farmers from MV Boro rice was Tk 4865.0, while this was Tk 24,858.0 per hectare. However, per hectare profit of well-to-do farmers from MV Boro rice (Tk 34,995.0/ha) was much higher than the profit of marginal farmers (Tk 24,858.0/ha). Similarly, a wide range of disparity was found between marginal and well-to-do farmers in terms of per hectare yield and using the major inputs for producing MV Boro rice. It can clearly be seen from Table 1 that well-to-do farmers applied more inputs and received, as expected, much higher per hectare yield (1235 kg) than those of marginal farmers. The causes of this disparity in per hectare yield of marginal farmers were that they could not purchase the required quantity of inputs (say, fertilizers) at the time of crying need of MV Boro due to tremendous shortage of financial capital. As a consequence, marginal farmers could not receive the expected yield although they were taking more care for MV Boro rice.

It may be noted here that before transplanting period (January - May 2008) of MV Boro rice, the price of foodgrain all over the World had gradually been increasing at the increasing rate both at home and in World markets. Having got this positive signal of higher prices of foodgrains, marginal farmers had given top most priority and very serious attention to the rice cultivation from the very beginning of the season. As a result, per hectare yield of MV Boro (4940 kg/ha) was higher than

Table 1 : Per Farm and per Hectare Costs and Returns of MV Boro Rice Production from the Viewpoints of Marginal and Well-to-do Farmers in 2008

Items	Marginal farmer per farm (a)	Marginal farmer per hectare (b)	Well-to-do farmer per hectare (c)	Disparity (c) - (b)
A. Rice yield (kg)	960.0	4,940.0	6,175.0	1,235.0
B. Gross return (Tk)	15,960.0	82,128.0	1,03,100.0	20,972.0
C. Gross costs (Tk)	11,095.0	57,270.0	68,105.0	10,835.0
i. Tillage cost (Tk)	864.0	4,446.0	4,446.0	0.0
ii. Seedling cost (Tk)	340.0	1,760.0	1,800.0	40.0
iii. Labour cost (Tk)	4,860.0	25,020.0	28,020.0	3,000.0
iv. Urea cost (Tk)	186.0	961.0	1,271.0	310.0
v. TSP cost (Tk)	896.0	4,480.0	5,888.0	1,408.0
vi. MOP cost (Tk)	180.0	1,050.0	2,400.0	1,350.0
v. Irrigation cost (Tk)	3,360.0	17,290	21,616.0	4,326.0
vi. Insecticide cost (Tk)	85.0	595.0	680.0	85.0
D. Net return (Tk)	4,865.0	24,858.0	34,995.0	10,137.0

Source: Adapted from Hossain 2009.

ever before. Due to price hike of foodgrains, in fact, no negative impact on per hectare yield of MV Boro rice was reflected in this study area. Rather, they have had good incentives to grow more food for their own safety and food security.

3.2 Interpretations of coefficients of Cobb-Douglas model

It is evident from Table 2 that six key independent variables were chosen for Cobb-Douglas production function model of MV Boro rice, which were: human labour cost (X_1), tillage cost (X_2), seedling cost (X_3), fertilizer cost (X_4), irrigation cost (X_5), and insecticides cost (X_6). However, management, land quality, soil type, sowing time and weather might be very important factors in producing MV Boro rice, but these were ignored in the study because of the paucity of data and time constraint.

It can be seen from Table 2 that the included variables are playing jointly or independently very significant role in producing MV Boro rice of marginal farmers. However, the estimated regression coefficient of tillage cost was -0.161 which was significant at 5 percent probability level. Negative sign indicates that an opposite relationship prevailed between gross return and tillage cost for the marginal farmers. It means that if tillage cost goes up by 1 percent, on an average, the gross return decreases by 0.161 percent provided rest of the variables were kept unchanged (Table 2). It may be noted here that before Boro cultivation, marginal farmers usually produce mustard in some plots and they cultivate those plots intensively. As a consequence, they can spend less amount of money for tillage operation during MV Boro cultivation.

Table 2 : Estimated Values of Coefficients and Related Statistics of Cobb-Douglas Production Function of MV Boro Rice

Predictors	Estimated coefficients	t-value
Constant or intercept	3.354	3.7
Human labour cost (X_1)	0.170**	2.5
Tillage cost (X_2)	-0.161**	-2.7
Seed ling cost (X_3)	0.164	1.5
Fertilizer cost (X_4)	0.138*	3.0
Irrigation cost (X_5)	0.454*	6.0
Insecticide cost(X_6)	0.720**	2.1
R^2	0.783	
Adjusted R^2	0.744	
F-value	19.873*	
Returns to scale.	1.485	

Source: Field survey 2009.

Note: * Significant at 1 percent level.

** Significant at 5 percent level.

The value of R^2 is 0.78. It implies that 78 percent variation in gross return from MV Boro of marginal farmers can be explained by the included variables considered in the model. In other words, 22 percent variation in the dependent variable i.e, gross return remains unexplained. On the other hand, F-statistic is computed to denote the goodness of fit any fitted model. The F-value for the model was 19.873, which was significant at 1 percent probability level. It means that explanatory variables included in the model were important for explaining the variation in gross return of MV Boro rice.

Returns to Scale. The summation of all the coefficients of the estimated production function of MV Boro rice was 1.485 (Table 2). This implies that the production function exhibits increasing returns to scale. In other words, marginal farmers were operating in the first stage of the production function. In this case, if all the variables specified in the model were increased by 1 percent, gross returns would increase by 1.485 percent. This finding coincides with the a priori knowledge that has been gathered during the data collection that marginal farmers could not employ adequate quantity of inputs and also in time due to lack of financial capital. As a result, they were obtaining relatively lower per hectare yield than those of the well-to-do farmers. This means that marginal farmers have a wider scope to increase MV Boro rice in future. Thus, they would be able to increase rice yield and hence, to ensure food security.

3.3 Food Security and the Logit Model

For estimating the effect of cereal price and other determinants on farm household's food security, the Logit model was chosen in this study. The determinants of food security were household income (X_1), price of rice (X_2), cultivable land (X_3), household size (X_4), per capita production (X_5), involvement in non-farm activities (X_6). This study altogether investigates the general effects of six factors on the food security status of the disadvantaged households of the study area.

The estimated parameters of the Logit regression model are given in Table 3. Each slope coefficient in this regression is a partial slope coefficient and measures the change in the estimated Logit for a unit change in the value of the given regressors, holding other regressors constant. In general, antilog of the j-th slope coefficient (if there is more than one regressor in the model), subtracting 1 from it, and multiplying the result by 100, gives the percent change in the odds for a unit increase in the j-th regressor (Gujarati 2003).

Household income (X_1). Household income is an important determinant of household food security. Higher income leads to have greater accessibility to food whereas household having low income remains vulnerable from the viewpoint of access to food since increase in food price reduces purchasing power of low income group and it eventually reaches to unaffordable level. So in this study higher income households were supposed to be food secured households, providing that there exists positive relationship between income level and food security. The income coefficient of 0.005 means, with other variable held constant, that if income increases by a unit, on average the estimated Logit increases by 0.005 units, suggesting a positive relationship between household income and food security. It may be noted that. Therefore, taking the antilog of the estimated logit, we get , that is, the odds ratio. It can easily be verified that .

This means that for a unit increase in income, the odds in favour of being food secured increases by 1.005 or about 0.5 percent.

Table 3 : Estimated Parameters of the Logit Regression Model

Variable	Coefficient/ value	Standard error	Significance	Exp ()
Odds ratio				
Constant	-24.735	22.744	0.277	0.000
Income (Tk)	0.005*	0.002	0.006	1.005
Price of rice (Tk/kg)	-0.078	0.454	0.864	0.924
Cultivable land (decimal)	0.041	0.099	0.680	1.042
Household size (No.)	-0.283	1.337	0.832	0.754
Per capita production	0.030**	0.014	0.026	1.031
Involvement in off farm activities	0.170	1.497	0.910	1.185
Model Chi-square	57.992*		0.000	
-2 Log likelihood	15.005			

Source: Field Survey 2009.

* Significant at 1 percent level of probability.

** Significant at 5 percent level of probability.

Price of rice (X_2). According to HIES 2005, people at rural areas consume 485.6 gm cereals (mainly rice) which is 58 percent of total per capita daily food intake. When consider the energy level in terms of kcal, rice also contributes the highest for the people of Bangladesh. So rise in price of the rice was expected to affect food security negatively. The price coefficient is -0.078, which means, with other variables held constant, if price of rice increases by a unit, on an average the estimated logit decreases by 0.078 units, suggesting a negative relationship between price of rice and food security. The odds ratio was 0.924. This means that for a unit increase in price of rice, the odds in favour of being food secured decreases by 0.924 or about 7.6 percent.

Table 4 shows that household vulnerability to food security increases as price of rice increases, which is also shown in Figure 1. The rate or change in probability is the rate by which probability of food security decreases for a unit increase in price of rice. Households become more and more food insecure as price of rice increases

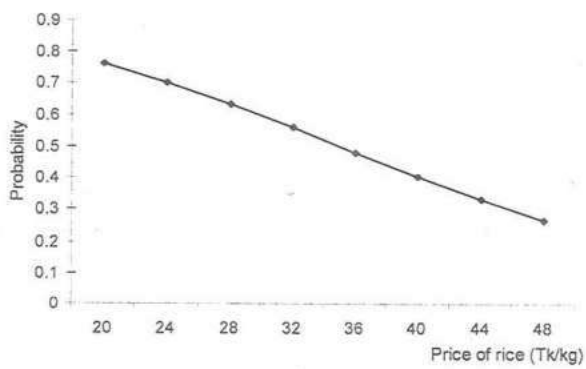
Table 4 : Probability of Household Food Security at different Prices of Rice

Price of rice (Tk/kg)	Probability of food security	Rate of change of probability
24	0.703181	-0.01628
26	0.669625	-0.01726
28	0.634249	-0.01809
30	0.597363	-0.01876
32	0.559342	-0.01923
34	0.520611	-0.01947
36	0.481631	-0.01947
38	0.442873	-0.01925
40	0.404799	-0.01879
42	0.367836	-0.01814
44	0.332365	-0.01731
46	0.298697	-0.01634

Source: Adapted from Hossain 2009.

From Table 4 it can be seen that if rice price per kg raises one unit from Tk 24, probability of food security decreases 0.016 or 1.6 percent. The empirical result

Figure 1 : Probability of Household Food Security at Different Prices



shows that household became food insecure when price of rice exceeded Tk 34 per kg. Any further increase of price bounds household to be food insecure. Most of the respondents reported that during the price hike period they had purchased rice at Tk 45 per kg. So impact of price hike on food security can easily be understood from the result.

Cultivable land (X_3). Cultivable land size is a continuous variable. This study expected Cultivable land size to affect food security status of households positively. According to Najafi (2003), food production can be increased extensively through expansion of areas under cultivation. Therefore, under subsistence agriculture, holding size is expected to play a significant role in influencing farm households' food security. The size of farmland owned by a household was determined by summing the fragmented plots, and converting it to hectares using a conversion factor. The cultivable land coefficient of 0.041 means, with other variables held constant, if cultivable land increases by a unit, on an average the estimated logit increases by 0.041 units, suggesting a positive relationship between cultivable land and food security. The odds ratio was 1.042……….. This means that for a unit increase in cultivable land, the odds in favour of being food secure increases by 1.042 or about 4.2 percent.

Household size (X_4). Household size is another factor expected to have influence on food security status of households since land and money to purchase agricultural inputs are very limited, increasing family size, tends to exert more pressure on consumption than the labour it contributes to production. Thus a negative relationship between household size and food security is expected as food requirements increases in relation to the number of persons in a household. The household size coefficient of -0.283 means, with other variables held constant, if household size increases by a unit, on an average the estimated logit decreases by 0.283 units, suggesting a negative relationship between household size and food security. The odds ratio was 0.753. This means that for a unit increase in household size, the odds in favour of being food secure decreases by 0.753 or about 24.7 percent.

Per capita production (X_5). Per capita aggregate production of rice, a factor affecting food security status of households, is expected to influence the food security status of households. Per capita aggregate production was computed by dividing the output realized by the farm family after deducting all kinds of payments and post harvest losses, by the household size. Per capita production coefficient of 0.030 means, with other variables held constant, that if per capita production increases by a unit, on average the estimated logit increases by 0.030 units, suggesting a positive relationship between per capita production and food security. The odds ratio was 1.030……... This means that for a unit increase in per capita production, the odds in favour of being food secure increases by 1.030 or about 3 percent.

Involvement in off farm activities (X_6). FAO (1999) report indicates that employment in off-farm and non-farm activities is essential for diversification of the sources of farm households' livelihoods. It enables households to modernize their production by giving them an opportunity to apply the necessary inputs, and reduces the risk of food shortage during periods of unexpected crop failures through food purchases.

In this study, participation in off-farm and non-farm activities was measured by whether or not a household was engaged in those activities i.e., a dummy variable was used. A household which was engaged in off-farm and non-farm activities took a value of one and households which did not engage in those activities took a value of zero. This variable in the model was qualitative in nature. The coefficient of the variable was 0.170. Positive sign indicates a positive relationship between food security and involvement in non-farm activities. A more meaningful interpretation in terms of odds was that, if we take antilog of the coefficient of 0.170, we get 1.185........ This suggests that households which were engaged in non farm professions were nearly 1.18 times likely to be food secure than those of the households were not engaged in non-farm activities, other things remaining the same.

4. Conclusion and plicy Imptications

It could be concluded that MV Boro rice is profitable from the viewpoint of marginal farmers. However, the output of MV Boro rice could further be increased if financial capital could easily be made available to the marginal farmers. A considerable scope apparently exists to increase rice production and thus, to secure food security of the vast majority people of Bangladesh.

Price hike has had some positive impacts on producers of foodgrain, but there was a negative impact on household food consumption. The adult female members were more victim of price hike of cereal than children.

Although MV Boro rice cultivation was profitable from the viewpoint of marginal farmers, These farmers could not apply fertilizers to the Boro plots in time due to lack of money. The financial institutions should come forward to disburse corruption free credit at a reasonable rate of interest so that they could purchase required inputs for MV Boro cultivation. Thus, Boro yield could be increased substantially and food security could be ensured.

The concerned scientists should give top most priority to develop submergence-tolerance new variety of broadcasting *Aman* paddy for this low-lying area so that the farmers could grow this *Aman* after harvesting MV Boro during April-May. Thus, the farmers could obtain more rice from the same plots by increasing

Appendix Table 1 : Per Farm and per Hectare Costs and Returns of MV Boro Rice Production from the Viewpoint of Marginal Farmers

Items	Per unit price (Tk)	Per farm (48 decimal)		Per hectare (247 decimal)	
		Quantity	Return/cost	Quantity (Tk)	Return/cost (Tk)
A. Gross Return					
MV Boro rice	16	960 kg	15,360.00	4940 kg	79,040.00
By-product	-	-	600.00	-	3088.00
Total	-	-	**15,960.00**	-	**82,128.00**
B. Gross Costs					
Seedlings	40	8.5 kg	340.00	44 kg	1760.00
Power tiller	2223	2 passes	864.00	2 passes	4446.00
Human labour:	220	9 mday	1980.00	45 mday	9900.00
Transplanting					
Weeding	180	4 mday	720.00	20 mday	3600.00
Harvesting	240	6 mday	1440.00	32 mday	7680.00
Threshing	240	3 mday	720.00	16 mday	3840.00
Urea	6.20	30 kg	186.00	155 kg	961.00
TSP	64	14 kg	896.00	70 kg	4480.00
MOP	30	6 kg	180.00	35 kg	1050.00
Insecticides	85	100 ml	85.00	700 ml	595.00
Irrigation water	14	240 kg	3360.00	1235 kg	17,290.00
Interest on OC	-	-	324.00	-	1668.00
Total	-	-	**11,095.00**	-	**57,270.00**
C. Net Returns	-	-	**4865.00**	-	**24,858.00**

Source: Adapted from Hossain 2009.

cropping intensity. An emphasis could also be given to encourage farmers to apply organic manure to increase per unit crop-yield.

Since the majority farmers were marginal farmers (around 73 percent) in the study area, genesous subsidy should be given to Triple Super Phosphate (TSP) and Muriate of Potash (MOP) so that the resource-poor farmers could buy and apply required doses of fertilizers for increasing MV Boro rice. Thus, food security could be ensured for the rural poor.

The high price of paddy, of course, gave a sort of incentive to the farmers (more particularly rich farmers) to grow MV Boro paddy more intensively, price support programme for the growers of paddy should be followed very strictly to ensure supply of paddy in the market.

Appendix Table 2 : Per Hectare Costs and Returns of MV Boro Production from the Viewpoint of Well-to-do Farmers in 2008

Items	Per unit price (Tk)	Quantity	Return/cost (Tk)
A. Gross Return			
MV Boro rice	16	6175 kg	98,800
By-product	-	-	4, 300
Total	-	-	**1,03,100**
B. Gross Costs			
Seedlings	40	45 kg	1800
Power tiller	2226	2 passes	4446
Human labour:			
Transplanting	220	48 man-day	10, 560
Weeding	180	25 man-day	4,500
Harvesting	240	36 man-day	8,640
Threshing	240	18 man-day	4,320
Urea	6.20	205 kg	1,271
TSP	64	92 kg	5,888
MOP	30	80 kg	2400
Insecticides	85	800 ml	680
Irrigation water	-	1544 kg	21,616
Interest on OC	-	-	1984
Total	-	-	68,105
C. Net Returns	-	-	**34,995**

Source: Adapted from Hossain 2009.

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