INPUT USE PATTERN AND ECONOMIC BENEFIT OF HIGH YIELDING AMAN RICE CULTIVATION IN SOME SELECTED AREAS OF COMILLA DISTRICT

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ABSTRACT

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The study was conducted at Hatigara, Rajmongolpur and Jurameher villages under sadar upazila of Comilla district during 2006-07 to asses the fertilizer doses, labour use pattern and the economic benefit of high yielding Aman rice production at farm level. Data were analyzed through tabular methods and accounts analysis technique. The average sizes of small, medium and large groups of farms were 0.42 ha, 1.28 ha and 3.17 ha, respectively. The study found that per hectare labour cost (53%) was the highest in small farm group followed by large (52%) and medium (51%) farms respectively. The small farms used lowest amount of all types of fertilizers. Per hectare net return was found to be the highest for medium farms (Tk. 13157) followed by large (12163) and small (11143) farms in the study area regarding full cost. Returns to labour were Tk. 123.13 /man-day, Tk. 133.31 /man-day and Tk. 126.62 /man-day on full cost basis for small, medium and large farms respectively. Benefit cost ratio was found highest for medium farms (1.34) followed by large (1.30) and small farms (1.28) regarding full cost which indicates that rural development could be possible with adoption of high yielding Aman rice in the present farming system. Some constraints were identified of which lack of extension contact, cheated due to adulteration of pesticides, lack of awareness about soil test, cheated adulteration during purchasing of TSP were the major constraints of high yielding Aman rice cultivation.

Key Words: Input use pattern, economic benefit, high yielding aman rice

INTRODUCTION

Rice is one of the most important cereal crops as well as staple food in Bangladesh. Rice is grown in three seasons, namely Aus (March/April- June/July), Aman (July/ August- Nov./Dec.) and Boro (Dec.- April). Rice crops grown always at risk due to biotic and abiotic factors for which the average rice yield (1.82 t/ha) is much lower than the potential yield (Quayum *et al.,* 2001). Now a days it occupies about 77% of total cropped area covering 26.6 million acres and is the only source of income for many farmers in our country and it constitutes about 67% of the agricultural production (GoB, 2005). In Bangladesh, 26.6 million acres of total cultivable land produce more than 25.2 million metric ton of rice annually. It provides about 71% of the total calories and 51% of the total protein in a typical diet in Bangladesh (BBS, 2004). High yielding varieties (HYVs) played an important role in the process of graduation from poverty. Land, labour, capital and management are the key four factors which are very important for increasing rice production in Bangladesh (Ahmed, 2001). Increased household food production and stabilization of prices of rice, would release resources for investment in education and health etc. and helped farm households to invest more in economic activities for increased income and diversification of non farm activities (Mia, *et al.* 2005). So, the new rice technology helps rural livelihoods more diverse and less dependent on agriculture for which the policy makers would have to understand the process of graduation of farm households from poverty by means of new rice technology. So there is a need for a separate study in this respect. So there is a great potentiality to increase rice production if the technology is being developed. The basic objectives of the study were as follows: i) to highlight the socio-economic characteristics of Aman rice growers ii) to find out the labour use pattern in high yielding Aman rice cultivation iii) to assess the doses of fertilizers used in high yielding Aman rice cultivation by the farmers iv) to assess the cost and returns of HYV Aman rice at farm level and v) to identify the problems and solutions related to rice production.

METHODOLOGY

Random sampling technique was followed to select the respondents. Thirty samples ranging from 20 to 25 percent of the total samples from each upazila were taken. Most of the people of the study area cultivate high yielding varieties of rice during Aman season. For this reason, these areas were selected for the study purpose. Data were collected just after harvesting the crop. Pre-designed and structured questionnaire was used for direct interview with the farmers. Selected samples were then grouped into small (0.02 ha to 1.00 ha), medium (1.01 ha to 2.00 ha) and large (2.01 ha and above) farm based on the farm size (operated land). Collected data were then summarized, tabulated and analyzed in accordance with the objectives of the study. Tabular method and accounts analysis technique have been followed in analyzing the data.

RESULTS AND DISCUSSION
Socio-economic profile of the farmers
An effort was made to focus briefly on some important features of the sample farmers. Socio-economic characteristics of the sample farmers affect their production patterns; technologies use, and influence their farm decision-making process. Enterprise combination, consumption pattern and employment of different farm households would be influenced by their various characteristics as well as some other socio-economic aspects of the farm households such as, age distribution, level of education, family size and composition, occupation, land ownership and dependency status etc.

Age: Age is the important factor for working in the field. Young aged farmer's works more than old age farmers because of their physical & mental energy. In this study not a single farmers found below the age of 20. For this reason age group was calculated from 20. Majority of the respondents was under the age range of 20-40 years. The respondents under this age group were 63.3% which indicates that mostly the active proportion of the population in terms of age was the growers of high yielding Aman rice.

*Level of education***:** Education helps a farmer to take risk and adoption of new technology. Gross *et al.* 1952 observed that the educated farmers differentiated themselves from non-educated ones with respect to the acceptance of recommended farm practices. Education helps a farmer to go to extension workers for solving any problem regarding crop production. According to the education level the farmers were categorized into four groups such as no education, primary level (up to class five), secondary level (class six to ten) and higher secondary and above. Among the high yielding Aman rice growers, large farmers appear to have a higher level of education than small and medium category of farmers. The study also revealed that most of the small farmers are not illiterate but have the basic primary education. Nearly 27 percent and 50 percent farmers have higher secondary and above level under medium and large farms while small farmers have none in their families.

*Family size***:** Family size and composition of farm families indicate availability of family labor. The family size in this study is defined as any number of persons either working or non-working and living together in the family, which includes wife, sons, unmarried daughters, father, mother, brother, etc. Number of adult male is the highest in large farm category then small and medium farm category but the number of children is the highest in the small farm category indicates dependent member on income earner is highest in the small farm group.

Farm size: Land holding is another socioeconomic condition for the farmers that sometimes indicate financial condition of the farmers. The average farm size of the small, medium and large farmers were 0.42 ha, 1.28 ha and 3.17 ha, respectively.

*Dependency status***:** Dependency status helps us to know the situation of economic solvency of the respondents. It's indicating that how many members of a family dependent on the head of the family and others. Table 1 showed that dependency ratio was the highest in small farmers than followed by medium and large category of farmers which means that in a small category of farmer's four members of a family depends on one member where in large farmers group one member depends on one member.

Labour use pattern in Aman rice production
Labour is an important input of crop cultivation. Human labour irrespective of home supplied and hired performed many physical operations such as land preparation, laddering, dressing, transplanting, weeding, application of fertilizer & manure, application of insecticides, harvesting and carrying, threshing, cleaning, drying and storing etc.

The small farmers incurred higher home supplied labour compared to medium and large farmers for doing the same activities (Table 2). For example, small, medium and large farmers used 46, 40 and 34 percent family labour respectively out of total labour required for producing BRRI dhan 32 (Table 4). For this reason, cash expenses on labour were proportionately low for small farmers compared to medium and large farmers. Small farmers might have abandoned unemployed or under employed family labour to be used in the agriculture sector. Family supplied labour might cause labour redundancy in agriculture, as they are not paid labour and changing the output. In contrast, medium and large farmers spent more than 30 percent of labour cost on hired labour for growing high yielding Aman rice cv. BRRI dhan 32. So cash cost on human labour for medium and large farmers were proportionately higher compared to small farmers (Table 4). Medium and large farmers were involved in service and business along with agriculture that might allow them to hire labour. They let their children go to school instead of agriculture field to work unlike small farmers. The study also found that female family labor was only engaged in post harvest activities i.e. drying, cleaning and storing etc.

Fertilizer use pattern in Aman rice cultivation

Fertilizer is another important input for producing high yielding varieties of rice. The application of inorganic fertilizer is indispensable for growing any crop in the country. In the study area three types of chemical fertilizer, namely Urea, TSP and MP were used by the farmers for producing high yielding Aman rice. The small farmers used lowest amount of all fertilizers due to their inability. Likewise, large and medium farmers consciously used highest doses of fertilizers than small farmers. The large farms used higher rate of urea and TSP than other two groups but lower rate of MP than the medium farms. The medium and large farms used equal amount of cowdung or compost which is higher than small farms.

Cost of Aman rice production

Total operating costs were classified into two major groups such as labour & power tiller cost and material costs. In addition these, two indirect costs namely interest on operating capital and land use cost were considered to compute total cost of producing BRRI Dhan 32. Cash cost define as all cash expenses while full cost defined as all cash and kind cost including fixed costs. Power tiller was used mainly for land preparation. Small, medium and large farmers used 11 percent of operating cost on power tiller for producing high yielding Aman rice. Seed/ seedlings were one of the most important material inputs for high yielding variety rice production. All categories of sample farmers used purchased seed/seedlings which is four percent of total cost. Small, medium and large farmers spent more or less same on pesticides which was three percent of operating capital. Twenty four percent of operating cost was spent on material inputs by medium and large farmers while it was 22 percent for small farmers for producing the same. Operating cost was found to be the highest for large farmers followed by medium and small farmers that increased interest on operating capital proportionately for producing per hectare BRRI dhan 32.

Returns from Aman rice cultivation

Per hectare production of BRRI dhan 32 was found to be the highest for medium farmers followed by large and small farmers. Residue or by product was proportionately produced and valued according to local contract. Summing up the value of main product and by product we had the total return per hectare of high yielding Aman rice. On an average per hectare gross margin was Tk. 12157 on full cost basis and on cash cost basis it was Tk. 17783 (Table 5). On an average returns to labour on full cost, cash cost and variable cost basis were Tk. 127.26/man-day, Tk. 249.60/man-day and Tk. 148.90/man-day, respectively. BCR was found highest for small farmers followed by medium and large farmers regarding cash cost. It was because small farmers spent 62 percent of gross cost in cash while medium and large farmers spent 65 and 68 percent of gross cost respectively (Table 4). The BCR indicates that rural farmers would be benefited with the cultivation of BRRI dhan 32 which means that rural development could be possible with adoption of high yielding verities of Aman rice in the present rice farming system in Bangladesh.

Problems and Possible Solutions

Farmers were asked to identify the problems they encountered in cultivation of high yielding Aman rice and their responses are presented in Table 6. The main problems and constraints was lack of extension contact mentioned by 66% respondents. Cheated due to adulteration of pesticide, cheated during purchasing of TSP, lack of awareness about soil test, high price of seed and fertilizer were the major problems identified by the farmers. Farmers also proposed their suggestions to overcome these problems. High yielding and short duration variety with package knowledge to be introduced, good quality and low price seed should be supplied in time, availability of chemical fertilizer and pesticide should be ensured, awareness build up should be made about soil test for using proper dose of fertilizer, extension contact on regular basis and output price should be ensured during the pick period.

CONCLUSION

High yielding Aman rice was found profitable. So, the farmers may be suggested to cultivate the high yielding rice in T. Aman season. The government should take necessary steps to overcome major production problems and constraints and also should take initiatives to expand the production areas of high yielding rice for the livelihood improvement of the farm households.

Table 1 Distribution of the sample respondents according to age group and farm category

Characteristics	Small	Medium	Large	Average
By age				
20-40 yrs	30 (67)	21 (64)	6 (50)	19 (63.4)
41-60 yrs	15 (33)	9 (27)	6 (50)	10 (33.3)
Above 60 yrs	0 (0)	3 (9)	0 (0)	1 (3.3)
Total	45 (100)	33 (100)	12 (100)	30 (100)
Education (yrs of schooling)				
No education	12 (27)	3 (9)	0 (0)	5 (17)
Primary (1-5 yrs)	24 (53)	9 (27.3)	3 (25)	12 (40)
Secondary (6-10 yrs)	9 (20)	12 (36.4)	3 (25)	8 (26)
Higher secondary and above (11-15 yrs)	0 (0)	9 (27.3)	6 (50)	5 (17)
Total	45 (100)	33 (100)	12 (100)	30 (100)
Family composition (No./Farm)				
Total family members	4.8	4.5	4.5	4.6
Adult mail	1.2	1.5	2	1.6
Adult female	1.4	1.0	1.0	1.1
Children (<15 yrs)	2.20	2.0	1.5	2.4
Farm size (ha/farm)	0.42	1.28	3.17	1.6
Dependency status				
income earner	1	1	2	1.3
Dependent	3.8	3.5	2.5	3.3
Dependency ratio	3.8	3.5	1.25	2.9

Source: Field survey data, 2007 and figures in the bracket indicate percentage

Table 2 Per hectare labour use pattern in the respondent farmers for producing Aman rice

Farm category	Family labor	Hired labor	Total
Small	79	93	172
Medium	70	105	175
Large	62	118	180
Total	211	316	527

Source: Field survey data, 2007

Table 3 Per hectare fertilizer use in the study area for producing Aman rice

Farm category	Urea (kg.)	TSP (kg.)	MP (Kg.)	Cow dung /Compost (Kg)
Small	124	124	62	2470
Medium	150	124	77	2964
Large	165	131	74	2964

Source: Field survey data, 2007

Table 4 Per hectare cost of producing Aman rice

Item	Small	Medium	Large	Average
Human labour (Tk/ha)				
Family labour	6320 (24.14)	5600 (20.58)	4960 (17.78)	5626 (20.76)
Hired labour	7440 (28.41)	8400 (30.87)	9440 (33.84)	8426 (31.10)
Power tiller	2964 (11.32)	2892 (10.63)	3039 (10.89)	2965 (10.94)
Material cost (Tk/ha)				
Seed/seedling	900 (3.43)	1175 (4.32)	1125 (4.03)	1066 (3.93)
Fertilizer cost (Tk/ha)				
Urea	744 (2.84)	900 (3.30)	990 (3.55)	878 (3.24)
TSP	1984 (7.58)	1984 (7.29)	2096 (7.51)	2021 (7.46)
MP	868 (3.30)	1078 (3.96)	1036 (3.71)	994 (3.67)
Manure	371 (1.42)	445 (1.64)	445 (1.60)	420 (1.55)
Pesticide cost	865 (3.30)	910 (3.34)	893 (3.20)	889 (3.28)
Interest on operating capital	645 (2.46)	711 (2.61)	763 (2.74)	706 (2.61)
land Rent	3090 (11.80)	3117 (11.45)	3109 (11.15)	3105 (11.46)
Cash cost	16136 (61.63)	17784 (65.35)	19064 (68.34)	17659 (65.17)
Variable cost	22456 (85.77)	23384 (85.93)	24024 (86.12)	23285 (85.94)
Total cost	26180 (100)	27212 (100)	27896 (00)	27096 (100)

Source: Field survey data, 2007 and figures in the bracket indicate percentage

Table 5 Comparisons of per hectare return and benefit cost ratio of Aman rice between farms categories

Item	Unit	Small	medium	Large	Average
Paddy yield	(kg/ha)	3789	4109	4051	3983
Price	(Tk/kg)	8.43	8.51	8.54	8.49
Straw	(Tk/ha)	1658	1573	1591	1607
Gross return	(Tk/ha)	33599	36541	36187	35442
Gross margin	(Tk/ha)				
Full cost basis		11143	13157	12163	12157
Cash cost basis		17463	18757	17123	17783
Net return	(Tk/ha)				
Full cost basis		11143	13157	12163	12157
Cash cost basis		7419	9329	8291	8346
Variable cost basis		17463	18757	17123	17783
Returns to labour	(Tk/man-day)				
Full cost basis		123.13	133.31	126.62	127.26
Cash cost basis		267.77	258.64	225.11	249.60
Variable cost basis		144.78	155.18	148.13	148.91
Benefit Cost Ratio					
Full cost basis		1.28	1.34	1.30	1.31
Cash cost basis		2.08	2.05	1.90	2.01
Variable cost basis		1.50	1.56	1.51	1.52

Source: Field survey data, 2007

Table 6 Constraints faced by the farmers and its solution in producing Aman rice

Problems and solutions	% of Respondents	Rank
Problems		
High price of seed	35	7
Lack of awareness about soil test	59	3
Lack of extension contact	66	1
High price of chemical fertilizer	42	6
Cheated due to adulteration of pesticide	60	2
Cheated during purchasing of TSP	56	4
Solutions		
Introduce high yielding and short duration variety	52	3
Supply good quality and low prices seed	56	2
Ensure availability of chemical fertilizer and pesticide in time	50	5
Grow awareness about soil test	47	6
Ensure extension contact on regular basis	62	1
Ensure output price during pick period	51	4

Source: Field survey data, 2007

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