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An Economic Study on Alternate Rice-Fish Culture in Selected Areas of Mymensingh District in Bangladesh

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Abstract: The study was conducted to determine the profitability of alternate rice-fish culture from the viewpoint of small, medium and large farmers. In total 80 alternate rice-fish producing farmers in which 24 small, 44 medium and 12 large farmers were purposively selected from each of the selected strata from three villages under Bhaluka Upazila of Mymensingh district for the study. The study showed that the alternate rice-fish culture was a profitable business. Per hectare costs of alternate rice-fish culture were Tk 46656.25, 47079.26 and 54268.74 for small, medium and large farms, respectively. Per hectare yield of fish, under small, medium and large farms were 1123.85, 1076.92 and 1179.80 kg, respectively and their corresponding yields of rice were 4323, 4491 and 4512 Kg. The average per hectare net returns from alternate rice-fish culture were Tk 27463.50, 28226.33 and 31018.61 for the small, medium and large farms, respectively.

Key words: Cost, return, profitability

INTRODUCTION

The rice-fish culture is an ancient practice in Asia. In recent years, the emphasis has been laid on its scientific improvement for offering a greater efficiency in resource utilization for reducing the risk and for providing the additional food and income. The success of rice-fish farming depends, however, on the complementary requirement of both the components. The integrated culture system was first introduced by FSRDP^[1] in Bangladesh and has now gained greater momentum in fish production system. By this time FSRDP has developed suitable technology on rice-fish farming for rural households. To determine the suitability and acceptability of different agro-ecological conditions FSES^[2] has conducted this alternate rice-fish farming programmes in rice fields at different location with Bangladesh Fisheries Research Institute (BFRI)^[3].

In the present context of Bangladesh agriculture, the major thrusts of 21st century agricultural research and extension should include generation and dissemination of highly productivity and eco- friendly technologies and mobilization of farm resources. Under such situation agriculture development is required to meet the basic needs for all, especially the landless and marginal farmers

and extending to all opportunity to fulfill their aspirations for a better future.

The growth rate of agriculture was 1.6 in 1990-91 which has increased to 3.12 in 1997-98 and sub-sector wise, crops grew from 1.2% in 1990-1991 to 1.62% in 1997-98. Growth rates for livestock and fisheries sub-sectors increased from 2.2 and 5.8% in 1990-91 to 8.0 and 8.60%, respectively in 1997-98. Thus the non crop agriculture exhibited a relatively higher rate of growth during the recent past years.

Bangladesh has got an excellent geographical location and suitable ecological condition particularly, during the monsoon. Considering the vast areas covered by Aman paddies the potential of integrated paddy-cum-fish farming even for extensive/ traditional type of management practice is great. This integration would be one of the best and most rational means of using our agricultural land.

The role of fisheries in our national economy is vital. It is an important sector in the economy of Bangladesh in terms of nutrition, income, employment generation and foreign exchange earning. Fish contributes about 60% of animal protein to our daily diet, 5% of our gross national production and 16.70% cultural production. More than 10% of total populations of Bangladesh are directly or

indirectly dependant on fisheries sector for their livelihood^[4]. However, there are enough scope for rice-fish culture and rice-shrimp culture in the extensive areas of rice fields where water stands for about 4-6 months.

There are vast areas of rice fields in Bangladesh where only boro rice is grown by the farmers during boro season and kept fallow for the rest of the period. These areas of rice fields provide potential scope for alternate method of rice-fish culture. Besides, there are also potential scopes for rice-shrimp as well as rice-fish culture in shrimp producing areas of Khulna, Shatkhira and Cox's Bazar districts by this alternate method. Alternate rice-fish culture systems not only provide an additional income to resource poor farmers but also increase the production of both rice and fish. In the regard very few studies were conducted in the past^[5,6].

Alternate rice-fish farming has expanded in different areas of Mymensingh district but in depth economic study yet not conducted to determine economic return and feasibility of alternate rice-fish farming. The present study was an attempt to conduct economic study on alternate rice-fish farming.

MATERIALS AND METHODS

Farmers of Bhaluka Thana in Mymensingh district practiced alternate rice-fish farming and they were selected for the present study. The preliminary information about location, number, areas of alternate rice-fish farmers were collected from the Thana Agricultural Office of Bhaluka. On the basis of this information a list of alternate rice-fish farmers was prepared. Three villages from Bhaluka thana namely, Randia, Gopalganj and Tetulia were purposively selected for data collection. A stratified random sampling technique was followed to classify the alternate rice-fish farmers depending on size of holdings. Farmers were classified into three groups which are as follows: Small farmers holding land between 0.02 to 1.01 ha (0.05 to 2.49 acres), medium farmers 1.02 to 3.03 ha (2.5 to 7.49 acres) and those of large farmers owned land between 3.03 ha and above (above 7.5 acres). For the present study 24 small farmers, 44 medium farmers and 12 large farmers were selected randomly. Thus, the total number of sample households was 80. Production practices and input use, costs and returns of alternate rice-fish farming were determined. Data were collected for the period 2000-2001.

RESULT AND DISCUSSION

The cost of fish production included cost of stockings, feed, fertilizer, labour, transportation and cost

of harvesting. Six different species of fish, i.e. Rui, Catla, Mrigal, Sarputi, Carpio and Silver Carp, were stocked for fish production. Alternate rice-fish farmers in the study area used purchased fingerlings. The average per hectare stocking density of fish was 15364.03 pieces. The average cost of fingerlings was Tk 15394.03. Artificial fish feeds were an important input to increase fish production. Supplementary feeds i.e., rice bran and oil cakes were used in this study area. Per Hectare cost of rice bran and oil cake were estimated Tk 1514.01 and Tk. 1918.71 for the all farms. In the study area, farmers used salt, Urea, TSP and lime as inorganic fertilizer and cow dung, poultry dropping as organic fertilizer. Per Hectare cost incurred for salt, Urea, TSP, lime, cowdung and poultry dropping were Tk. 436.09, 721.85, 899.53, 393.20, 1478.57 and 541.97, respectively. Human labour cost was the most important input. It was required for different operations. The average amount of labour cost was Tk 1437.67. Per hectare total labour cost was the highest in large farms, which was Tk 3375.67, followed by medium and small farmers which were Tk 1213.22 and 946.83, respectively. The average per hectare transportation cost was Tk. 1707.29. The average per hectare netting cost was Tk 7179.43. The averages per hectare total costs of fish production were Tk 33642.35. Per hectare total cost was the highest in large farmers which was Tk 39975.13 followed by small and medium farmers which were Tk 33439.33 and 32025.33, respectively (Table 1).

The cost of rice production included cost of human labour, cost of animal power and material inputs cost. Human labour was the most important and largely used input for rice production. Human labour was used for various kinds of operation like land preparations, transplanting, weeding, fertilizing, insecticide application, harvesting, carrying, threshing, drying and stocking. Per hectare total human labour cost was Tk 7090.50. Per hectare total cost of human labour were Tk 6925.28, 7249.68 and 7837.95 for the small, medium and large farmers, respectively. For rice production animal power was used only for land preparation and threshing. The total costs of animal power were Tk 965.30, 950.60 and 1066.10 for the small, medium and large farms, respectively. For rice production, material input cost is an important item which included the cost of rice seeds, cost of cowdung, cost of fertilizers, cost of insecticides and cost of irrigation. The average per hectare material input cost was Tk 6176.76. The material input cost was the highest in medium farms which was Tk 6853.65 followed by large and medium farms which were Tk 5389.56 and 5326.25, respectively (Table 2).

Average cost of alternate rice-fish culture was estimated on the cash cost basis. The average per hectare

Table 1: Input used and relative cost of fish culture for all farms

Input used	Small farmers		Medium farmers		Large farmers		All farmers	
	Quantity (Unit)	Cost (Tk)	Quantity (Unit)	Cost (Tk)	Quantity (Unit)	Cost (Tk)	Quantity (Unit)	Cost (Tk)
Fingerlings (No.)	17346	17346	13849.63	13849.63	17152.92	17152.92	15364.03	15364.03
Feed:								
Rice bran (kg)	967.97	967.97	981.41	1364.76	1696.07	3153.37	1084.58	1514.01
Oil cake (kg)	175.09	1179.29	288.72	2097.30	372.48	2742.69	267.50	1617.45
Fertilizer:								
Salt (kg)	48.90	303.32	78.77	529.55	46.93	358.97	65.03	436.31
Urea (kg)	89.37	536.24	131.82	790.92	139.97	839.82	120.31	721.86
TSP (kg)	74.10	1037.40	66.69	960.006	66.69	399.66	68.91	979.27
Lime (kg)	50.30	314.36	67.93	410.29	74.1	488.24	63.57	393.20
Cow dung (kg)	2969.48	1484.74	3150.61	1575.31	2223.0	1111.50	2957.14	1478.57
Poultry dropping (kg)	938.60	355.75	1254.76	532.53	988.00	949.00	1119.90	473.72
Labour cost	-	946.83	-	1213.22	-	3375.67	-	1457.67
Transportation cost	-	1547.34	-	1788.62	-	1729.00	-	1707.29
Netting cost	-	7420.085	-	6913.19	-	7674.29	-	296.40
Total	-	33439.33	-	32025.326	-	39520.13	-	33322.81

Table 2: Input used and relative cost of rice production for all farms

Input used	Small farmers		Medium farmers		Large farmers		All farmers	
	Quantity (Unit)	Cost (Tk)	Quantity (Unit)	Cost (Tk)	Quantity (Unit)	Cost (Tk)	Quantity (Unit)	Cost (Tk)
Rice seed (Kg)	29.33	293.30	31.66	316.60	37.46	374.60	31.83	318.31
Cow dung (Kg)	2770.00	1235.00	2771.89	1385.94	988.00	494.00	2503.74	1206.87
Urea (kg)	78.83	473.01	111.37	668.25	122.68	736.06	103.30	619.85
TSP (kg)	53.63	776.29	72.51	1025.87	88.51	1327.65	69.25	1010.56
MP (Kg)	30.13	241.07	37.46	363.09	51.46	360.22	37.36	326.05
Insecticides	-	205.83	-	277.74	-	312.87	-	261.44
Irrigation	-	2101.75	-	2790.16	-	1784.16	-	2432.74
Human labour (man days)	122.31	6925.36	129.69	7249.68	135.84	7837.95	124.36	7240.62
Animal power (pair days)	13.79	965.30	13.58	950.60	15.23	1066.10	13.89	972.34
Total		13216.91		15053.93		14293.61		14388.78

Table 3: Combine cost and economic return of rice and fish under alternate rice-fish culture

Items	Farm sizes							
	Small farms		Medium farms		Large farms		All farms	
	Qty. (unit)	Return (Tk)	Qty. (unit)	Return (Tk)	Qty. (unit)	Return (Tk)	Qty. (unit)	Return (Tk)
Returns								
Fish (kg)	1123.85	46830.83	1076.2	46016.79	1179.80	56040.50	1105.93	47764.48
Rice (Kg)	4323	25848.08	4491	27813.66	4512	28011.85	4444	27253.72
By-product (straw)	-	1440.83	-	1475.14	-	1235.00	-	1428.83
Gross return		74119.74		75305.59		85287.35		76447.03
Costs								
Fish production	-	33439.33	-	32025.326	-	39520.13	-	33322.81
Rice production		13216.91		15053.93		14293.61		14388.78
Gross cost (Tk)		46656.24		47079.26		54268.74		48031.13
Net benefit (Tk)		27463.5		28226.33		31018.61		28415.90

cost of alternate rice-fish culture was Tk 46656.24, 47079.26, 54268.74 and 48031.13 for the small, medium, large and all farms, respectively

Alternate rice-fish culture comprises two components namely fish and rice. The average per hectare yield of fish was 1105.93 kg. Per hectare returns from fish was Tk 47764.48. For rice components average per hectare yield was 4444 Kg. Moreover, the alternate rice-fish farmers obtained a large volume of rice plant stand as by-products. The weight of by-products was difficult to estimate but it was valued according to estimates provided by the alternate rice-fish farmers. The average

per hectare return from the by-products of rice was Tk. 1428.83. The average gross return from alternate rice-fish culture was Tk 76447.03. The total returns from alternate rice-fish culture were Tk 74119.74, 75305.59 and 85287.35, respectively for small, medium and large farms. The average net return from alternate rice-fish culture was Tk. 27463.50, 28226.33, 31018.61 and 28415.90 for small, medium large and all farms.

Rice fish culture is a profitable enterprise. Farmers of our country introduce this method rapidly. Alone rice production, it is observed that farmer follow traditional method of cultivation and their production are not

increased for the growing population of the family. So if we meet the demand of the mass population and supply nutrition, we must practice rice fish culture at a time. Application of scientific methods in alternate rice-fish culture should be ensured. The practice needs to be popularized among the farmers in order to take advantage of economic benefit obtainable from this practice.

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