

## Present Status and Potentiality of Shrimp in Bangladesh

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**Abstract:** Shrimp and prawn together represent the second largest exportable items contributing to foreign exchange earnings of Bangladesh. Shrimp farming has significant impact on environment and economy. Although the country has a great history of shrimp/prawn farming, the productivity of shrimp is very low compare to the other shrimp producing countries of the world. One of the major causes of poor productivity is the extensive or traditional method of farming (90 percent of total farms), whereas developed countries brought their farms under intensive or semi-intensive methods of farming. The farmers of the study area practiced golda-cum-rice pattern and the productivity of golda and T. Aman rice has found 505 kg/ha and 3497 kg/ha, respectively. 72 percent famers of the study area chose golda farming as the main occupation and shared 83.4 percent of their annual income where as rice shared 8.88 percent only. So, golda has significant importance to the socioeconomic and livelihood status of the farmers. However, it is possible to increase shrimp/prawn productivity more than 600 kg/ha through traditional organic system of farming. Besides, this study showed that Bangladesh has great potentiality to increase productivity of shrimp and prawn by introducing intensive and semi-intensive methods of farming.

**Key word:** Shrimp, Prawn, Rice, Productivity, Status and Potentiality.

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### INTRODUCTION

The economy of Bangladesh mainly depends on agriculture, readymade garments (RMG), fisheries and hides & skins. Shrimp export and cultivation in Bangladesh has undergone rapid expansion over the last two decades. Shrimp and prawn together represent the second largest exportable items contributing to foreign exchange earnings of Bangladesh. Between 1983 and 2003 the volume of shrimp and prawn cultivated in inland aquaculture has increased more than 14 times (DoF, 1985-2004). Over the same period, the area of ponds dedicated to shrimp and prawn production has more than trebled.

Shrimp is a particularly valuable export crop generating substantial revenues and foreign exchange; earning in excess of US\$360 million annually and accounting for 4.9 percent of exports in 2004. Not only this sector earns valuable foreign exchange, but also employs significant numbers of rural workers and provides a livelihood for households throughout Bangladesh. The contribution series of upstream and downstream activities related to shrimp/prawn culture such as harvesting, culture, processing and exporting (Barmon *et al*, 2004). The shrimp/ prawn industry consists of distinct sub-sectors such as shrimp/ prawn *gher*, shrimp hatcheries or post larvae (PL) collection, feed processing mills and shrimp/ prawn processing and exporting plants. All these sub-sectors are linked together and constitute a horizontal integration of activities that create independent employment opportunities for males and females. Bangladesh Shrimp and Fish Foundation estimate that there are over 600,000 people employed directly in shrimp aquaculture who support approximately 3.5 million dependents (Islam *et al*, 2011).

Despite the rapid growth of Bangladeshi shrimp cultivation, the global frozen fish and seafood market continues to be dominated by Thailand, Indonesia, China and Ecuador. Significant innovations in production and processing in these countries have increased the value added associated with their exports and the market share that they command. Unfortunately, the same is not true for Bangladesh. Innovations in both production and processing have yet to be secured. Furthermore, stricter import requirements and compliance regulations in importing countries have meant that Bangladesh must invest in improving the safety and quality of their fish and seafood exports to avoid products being detained and rejected at point of entry into foreign markets. IFPRI (2003) report notes that: "The only way Bangladesh can improve its export position in the shrimp market is to improve the safety and quality of its exports." Haque (2004) told, "Roughly 33 per cent of the shrimps grown in Bangladesh are exported. Though shrimp fetch a large amount of foreign exchange through exports, it is not an

unmixed blessing". MoF (2002) expressed, "Shrimp farming is a key element in the economy of Bangladesh. Currently, Bangladesh produces 2.5 per cent of the global production of shrimp, and the shrimp sector is the second largest export industry. There are 600,000 people employed in the shrimp sector in Bangladesh generating US\$301 million annually, from *bagda* and *golda* farms (US\$243 million from *bagda* alone). Yet the industry suffers from significant production inefficiencies and is exposed to important social and environmental risks." Uddin (1995) conducted a study on the prawn (or shrimp) farming of Khulna and Satkhira district. He found that most of the farmers in Satkhira district followed improved traditional method in prawn farming which resulted in higher yield. Per hectare cost of prawn was Tk. 62,613.26 in Satkhira district while it was Tk. 41,815.69 in Khulna district. He also found that per hectare net income in Satkhira district was Tk. 78,374.60 and in Khulna district it was Tk. 32,447.49 which means that net income in Satkhira district was 2.41 times higher than that of Khulna district. In all respect, prawn farming in Satkhira district was more profitable compared to Khulna district. Alam (2007) conducted a study on economic returns of disease-affected extensive shrimp farming in southwest Bangladesh. They revealed that profitability of operations was affected by fluctuating yields and prices due to diseases, and generated economic risk. The average total cost of production per hectare was 63437.57 Bangladeshi Taka (US\$ 1,084.40/ha). The farmers achieved a variable yield of black tiger shrimp (*Penaeus monodon*), ranging from 241.48 kg/ha to 455.03 kg/ha, with a mean yield of 146.39 kg/ha, through multi-stock and multi-harvest methods. The gross and net incomes per hectare were Tk 49999.87(US\$854.69) and Tk 40307.04 (US\$689.01), respectively. Of the total biomass, 44 percent came from *P. monodon*, while the rest (23 percent and 33 percent) came from other prawn and finfish respectively. The return to total cost of *P. monodon* was a negative profit (Tk 0.78).

It is clear that Bangladesh has the potential to increase production, raise productivity, upgrade processing facilities, and draw further land into shrimp cultivation. Yet, significant challenges remain ensuring that shipments meet standards set by the importing nations. Additionally, if growth in the industry is to benefit the poor and ameliorate inequality attention must be paid to the terms & conditions of employment & production, and the social & environmental impact of activities in this sector. The objective of this study was to determine present status and potentiality of shrimp/prawn farming in Bangladesh.

## MATERIALS AND METHODS

### Survey Area, Sampling and Data Collection:

Both primary and secondary data were considered in this study. In case of primary data, the study area was *Chalna Pawrasava* of *Dacope Upazila* in Khulna District. About 2 years ago shrimp (*Bagda*) farming was practiced in that area. Due to realize the negative impact of year-round saline water shrimp farming on environment, health, housing and livestock, people has shifted to the rice-cum-prawn farming. Now they are cultivating *Aman* rice (some cases *Boro*), vegetables and rearing livestock's besides prawn culture.

A reasonable size of sample to achieve the objectives of the study was considered. A purposive sampling technique was followed in this study. Primary data on shrimp farm management practices of 300 farmers were collected from a face to face interview from four different villages with the head of each sample household to fulfill the objectives of the study. The questionnaire contained mostly open-ended guiding questions covering the major aspects of shrimp farm management practices. The secondary data used in this study were from text books, journals, government papers, research reports, online materials and periodicals.

### Analytical Technique:

Data on shrimp farm management practices were mainly analyzed using descriptive statistics such as mean, median and percent. Activity budget was used to analyze the profitability of shrimp/prawn farming.

Activity budget is the most common method of determining and comparing the profitability of different farm households and technologies. Profit is defined as the difference between the total revenue and total cost. To determine per hectare profitability for each of the selected shrimp/prawn farming from the view point of individual farmers, the following algebraic equation was followed:  $\pi = TR - TC$

$$\pi = \sum Q_y \cdot P_y + \sum Q_b \cdot P_b - \sum_{i=1}^n (X_i \cdot P_{xi}) - TFC$$

Where,

$\pi$  = Net returns from shrimp/prawn (Tk/ha);

$Q_y$  = Total quantity of (shrimp/prawn) outputs (kg/ha);

$P_y$  = Per unit prices of the shrimp/prawn (Tk/kg);

$Q_b$  = Total quantity of the concerned byproduct (kg/ha);

$P_b$  = Per unit prices of the relevant byproduct (Tk/kg);

$X_i$  = Quantity of the concerned  $i^{\text{th}}$  inputs;

$P_{xi}$  = Per unit price of the relevant  $i^{\text{th}}$  inputs;  
 $TFC$  = Total fixed cost involved in production;  
 $i = 1, 2, 3, \dots, n$  (number of inputs).

## RESULTS AND DISCUSSIONS

### Present Status of Shrimp in Bangladesh:

Shrimp production in Bangladesh has been extended to the southern part of the country for its biological advantages. The shrimp farms are established in Chittagong, Barisal, Khulna and Dhaka divisions of the country. About 246198 hectare area of the country has come under shrimp production during 2009-10 and the total production was 155866 tonnes. So the productivity of shrimp is 633 kg/ha (Aftabuzzaman, 2010).

In FY2000-01 shrimp exports amounted to Tk. 1885.15 Crore which was 5.77 percent of total exports and share of shrimp export in total export income from fish and fish products was almost 93 percent. More than 2 million people are engaged in upstream and downstream activities related to shrimp industry in the country - in harvesting, culture, processing, exporting and other ancillary activities. In FY2010-11 shrimp exports amounted to Tk. 3400 Crore which was 2.73 percent and 76.46 percent of total exports and total fish products export, respectively. During the period 2000 to 2011 export of shrimp has been increased from 29.713 M. Ton to 109 M. Ton (Table 1) but contribution on total export has been decreased from 5.77 percent to 2.73 percent (BBS, 2011).

### Present Status of Selected Shrimp Farmers:

The choice of an occupation by the farmer varies greatly depending on how much they are involved and what level of income is earned from the present occupation. In the study area, most of the sample farmers' main source of income and livelihood were prawn and rice farming. Limited numbers of people were engaged in other occupations like vegetable cultivation, lentil farming, watermelon farming, business etc.

The occupations of selected farmers of different categories are presented in Table 2. Most of the farmers in the study area were involved in farming. Generally a rational farmer of the study area cultivates both *Golda* and rice. But in terms of their view of main occupation, 72 percent of total selected farmer considered the main occupation as *Golda* farming following by rice farming 17 percent. So, *Golda* farming was the core occupation chosen by the farmers of the study area.

In the present study, gross margin for *T. Aman* rice and *Golda* farming were estimated at Tk. 32,556 and Tk 286,286 per hectare, respectively. Per hectare net return of *T. Aman* rice was Tk 25,083 and that was Tk 207,725 for *Golda* farming (Table 3). The undiscounted benefit cost ratio (BCR) of *T. Aman* rice and *Golda* farming were 1.98 and 1.75 respectively which indicated that production of *T. Aman* rice and *Golda* were profitable from the viewpoints of individual farmer's investment in the study area. The result showed that *Golda* farming was more profitable than *T. Aman* rice though per hectare investment cost was much higher than *T. Aman* rice cultivation. The farmers did not practice mixed cropping in the study area.

Because of higher net return *Golda* became the main source of income in the study area. Average household income can be used as an indicator for the monetary well-being of a family as well as a particular area. It's also a good indicator of living. Average household income can be used as an indicator for the monetary well-being of a family as well as a particular area. It's also a good indicator of standard of living. Average annual household incomes of the selected farmers are presented in Table 4. Thus, *Golda* farming was the highest contributor to the household income (83.40 percent) followed by rice farming (8.88 percent) which is presented in Table 4. So, *Golda* farming was the significant contributors to the household income.

**Table 1:** Export of Fish and Fish Products from Bangladesh

Year	Export of Shrimp		Total Earnings from Export of Fish Product Value (Cr. Taka)	% of Shrimp to Total Fish Product Export Earnings	% of Total Export Earnings
	Quantity (M. Ton)	Value (Cr. Taka)			
2000-01	29.713	1885.15	2032.75	92.739	5.77
2001-02	30.209	1447.76	1637.14	88.432	4.76
2002-03	36.864	1719.88	1941.59	88.581	5.10
2003-04	42.943	2152.77	2363.47	91.085	5.71
2004-05	46.533	2281.59	2571.72	88.719	5.90
2005-06	49.317	2698.35	3029.84	89.059	4.56
2006-07	53.361	2992.33	3352.89	89.246	4.90
2007-08	68.52	3055.00	3777.00	80.884	3.90
2008-09	75.00	2409.00	3201.00	75.258	2.99
2009-10	109.00	2580.00	3079.00	83.793	2.75
2010-11	55.96	3400.00	4447.00	76.46	2.73

Source: Adapted from BBS (2011).

**Table 2:** Distribution of sample farmers according to their main occupations

Occupation	Number of farmer	Percentage of total
<i>Golda/Bagda</i> farming	216	72.00
Rice farming	51	17.00
Business	20	6.66
Service	13	4.33
Total	300	100.00

Source: Field survey (2012).

**Table 3:** Per Hectare Costs, Return, Gross Margin, Net Return and BCR of *Golda* and *T. Aman* Rice Farming

Items	<i>Golda</i> farming	<i>T. Aman</i> rice farming
Gross returns (Tk/ha)	418,725.00	58,237.00
Variable costs (Tk/ha)	132,439.00	25,681.00
Gross margin (Tk/ha)	286,286.00	32,556.00
Fixed costs (Tk/ha)	78,561.00	7,428.00
Total costs (Tk/ha)	211,000.00	33,109.00
Net returns (Tk/ha)	207,725.00	25,083.00
BCR (Undiscounted)	1.98	1.75

Source: Field Survey and Estimated by the Author (2012).

**Table 4:** Sector-wise share of household income of selected farmers

Sources of household income	Amount (Tk.)	% of total
<i>Golda</i> culture	235580.00	83.40
Rice farming	25,083.00	8.88
Fish culture	10000.00	3.54
Vegetables production	4230.00	1.50
Cattle rearing	4196.00	1.49
Goat rearing	714.00	0.25
Poultry and duck rearing	1457.00	0.52
Small business	1214.00	0.43
Total	282474.00	100.00

Source: Field Survey (2012).

**Appendix 1:** Activity Budgets: Costs and Return of Per Hectare *T. Aman* Rice Production

Items of costs/ returns	Total Quantity/ha	Per unit price (Tk)	Costs/Returns (Tk/ha)	% of total
<b>A. Gross Returns</b>				
Main product (Rice)	3497 kg	15.00	52,455.00	90.07
By-product (Straw)	n.a	-	5,782.00	9.93
Total returns	-	-	58,237.00	100.00
<b>B. Gross Costs</b>				
<b>C. Variable Costs</b>				
Seedlings	n.a	-	3,744.00	11.31
Power tiller	2 times	10.00/decimal	4,940.00	14.92
Hired labour	45 Man-day	250/Man-day	11,250.00	33.98
Urea	105 kg	20/kg	2,100.00	6.34
TSP	65 kg	22/kg	1,430.00	4.32
MoP	16 kg	15/kg	240.00	0.72
Fertilizers cost	-	-	3,770.00	11.38
Manure	-	-	631.00	1.91
Insecticides	n.a	-	1,346.00	4.07
Total	-	-	25,681.00	77.57
<b>D. Fixed Costs</b>				
Family labour	28 Man-day	250/Man-day	7,000.00	21.14
Interest on OC	-	@10%	428.00	1.29
Total	-	-	7,428.00	22.43
E. Total costs	-	-	33,109.00	100.00
F. Gross Margin (A-C)	-	-	32,556.00	-
G. Net Return (A-E)	-	-	25,128.00	-
H. Undiscounted BCR	-	-	1.75	-

Source: Field survey (2012).

**Appendix 2:** Activity Budgets: Costs and Return of Per Hectare *Golda* Production

Items of costs/ returns	Quantity/ ha	Per unit price (Tk)	Costs/Returns (Tk/ha)	Percentages of total
<b>A. Gross Returns</b>				
<i>Golda</i>	505.00 kg	745.00/kg	376,225.00	89.85
Other fish	425.00 kg	100.00/kg	42,500.00	10.15
Total Returns	-	-	418,725.00	100.00
<b>B. Gross Costs</b>				

C. Variable costs				
Post larva	10462 pieces	4.00/piece	41848.00	19.83
Hired labour	215 man-day	250/ man-day	53750.00	25.47
Feed	1231 kg	25/kg	30775.00	14.59
Lime	118 kg	12/kg	1416.00	0.67
Urea	10 kg	20/kg	200.00	0.09
TSP	5 kg	22/kg	110.00	0.05
Other fish fry	-	-	4340.00	2.06
Total			132,439.00	62.77
D. Fixed costs				
Family labour	296 Man-day	250/man-day	75250.00	35.66
Interest on operating capital		@10%	3311.00	1.57
Total			78,561.00	37.23
E. Total costs			211,000.00	100
F. Gross Margin (A-C)			286,286.00	
G. Net Return (A-E)			207,725.00	
H. BCR (undiscounted)			1.98	

Source: Field survey (2012).

### Potentiality of Shrimp in Bangladesh:

This study has been undertaken to detect the socioeconomic impact of sluice gate and salinity control to the coastal area. A good number of positive impacts have been identified. After the introduction of salinity control farming in southwest Bangladesh the cropping patterns has been changed. Farmers are cultivating more rice, vegetables and rearing cattle besides fresh water prawn culture instead of brackish water shrimp. The farmers of the study area practiced rice-cum-prawn farming system. Although salinity was not fully controlled, the productivity of *T. Aman* rice was 3497 kg/ha (Appendix 1) and it shared 8.88 percent of their annual household income. However, *Golda* has the largest share (83.40 percent) to the annual household income (Table 4). The farmers of the study area did not follow the semi-intensive/intensive method of prawn culture. As a result the productivity of prawn was lower (505 kg/ha) (Appendix 2) than the other shrimp producing nations as well as the national average of organic farming (633 kg/ha). The productivity of shrimp in the other countries is much higher. The productivity of shrimp at Australia and Thailand are 4000 kg/ha and 2500 kg/ha, respectively. Both of the country brought 40 percent and 25 percent of their farms under intensive culture as well as 60 percent and 70 percent under semi-intensive culture, respectively. Productivity at Malaysia and Philippines are 1500 kg/ha and 670 kg/ha, respectively as both of the country brought 60 percent of their farms under semi-intensive culture (Adapted from, Ronnback, 2002). So, Bangladesh has a great potentiality to increase the productivity of shrimp through intensive and semi-intensive culture.

It can be concluded that Bangladesh has a great potential for shrimp culture. There are about 217877 ha lands for shrimp/prawn culture (BBS, 2010). Present average yield is only 633 kg/ha but there is enough scope to increase yield more than this by introducing semi-intensive /intensive culture, proper management and improved technology of farming for the development of shrimp/prawn sector in Southwest Bangladesh to boost up national productivity and foreign currency. Extension workers can introduce salt tolerant rice varieties at *Aman* and *Boro* seasons. Department of fisheries can introduce the impact of shrimp/prawn on environment and the potentiality and profitability of organic farming.

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