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PROBLEMS IN USING MODERN FISH PRODUCTION TECHNOLOGY PERCEIVED BY THE FARMERS OF DERAI UPAZILA UNDER SUNAMGANJ DISTRICT

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Abstract

The focus of the study was to determine the extent of problems perceived by fish farmers in using modern fish production technology. Data were collected from randomly selected 40 farmers of eight villages of Rajanagar union under Derai Upazila, Sunamganj district using a pre-tested interview schedule from 4 September to 20 September, 2020. Through FGD with the fish farmers, 10 problems were identified. A 4-point rating scale was used to ascertain the severity of each problem, where "3" indicated a "very severe problem", "2" for "severe", "1" for "less severe" and "0" for "not at all severe problem". Results revealed that the overwhelming majority (85%) of the fish farmers had medium to a high problems with adopting modern fish production technologies, while only 15% had low problems. The major perceived problems were the high price of fish feed, lack of supply of quality fish feed, lack of a system for ensuring a reasonable price of fish at the local market, lack of proper understanding of the use of modern fish production technology, and lack of sufficient capital for fish farming for which only 24% of fish farmers adopted 'Thai Pungus culture' followed by 17% Thai koi culture, 15% Pabda culture, 14% Tengra culture and 10% Carp culture- despite having all potentials to be adopted by farmers. Pearson's product-moment correlation coefficient (r) showed that education, farm size, extension media contact, and knowledge of farmers had a significant negative relationship with their perceived problem in using modern fish production technology.

Keywords: Fish farmer, Modern fish production technology, Problems, Haor.

Introduction

Freshwater fisheries play a significant role in the livelihoods of rural and poor people in Bangladesh (Mazid, 2002). Fish farming has been proved profitable and attractive business compared to the rice or other agricultural cultivations. A large number of people have improved their socio-economic conditions through fish farming activities in Bangladesh (Roy et al., 2005). Aquaculture practice has the potential to achieve self-sufficiency in the food sector and to reduce poverty in Bangladesh (Al-Amin et al., 2012). In 2012, this sector (capture fisheries and aquaculture combined) provided 4.4 percent of the national GDP and 25% of agricultural GDP (MoF, 2012). The total production of this industry is 3.41 million tons, with inland aquaculture accounting for 55%, inland capture fisheries for 28%, and marine fisheries accounting for 17%. (DoF, 2013). Many haors encompass large regions of Sylhet, Moulvibazar, Sunamganj, Habiganj, Netrokona, Mymensingh, and Kishoreganj districts. The haor basin is important for commercially and ecologically fish production (Salauddin and Islam, 2011). Sunamganj is one of the most important districts for aquaculture and fish culture propagation in the division of Sylhet, Bangladesh. Derai Upazila is one of the twelve Upazilas of Sunamganj district surrounded with the area of 420.93 sq. km, located between 24°39′and 24°.53' north 1atitudes and in between 91°10' and 91°28' east longitudes. Based on the location, it could be one of the ideal fish production areas of Bangladesh.

Furthermore, haor areas are susceptible to various issues, including food scarcity, damage from floods, erosion, excessive rain, cyclones, and land loss (DoF, 2009). Although large numbers of people are involved in fish farming and having all the physical facilities in the haor area for boosting fish production, fish farmers are far away from the use of

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modern fish farming. It indicates that there are some problems between the technology and the farmers for which fish production in the haor area remains stagnant. Therefore, the present study was carried out to assess the problems and their nature in adopting modern fish production technology by the fish farmers.

Materials and Methods

The study was conducted in eight villages of the Rajanagar union under the Derai Upazila of Sunamganj district. Out of a list of 267 farmers under these eight villages, 40 farmers were selected randomly for interview. Data were collected from them during 04 September to 20 September, 2020 by using a structured questionnaire. Through FGD with the fish farmers, 10 problems were identified. To measure the extent of the problem perceived by the farmers in adopting modern fish production technology, each respondent was asked to answer ten questions that were constructed on various aspects of modern fish production. A 4-point rating scale was used to ascertain the severity of each problem, where '3' indicated 'very severe problem', 2 for 'severe', 1 for 'less severe', and 0 for 'not at all severe problem'. The summation of obtained score against ten questions represented the extent of the problem in using modern fish production technology of any respondent. The extent of the problem in using modern fish production technology, scores of the farmers could range from 0 to 30, where 0 indicated a low problem and 30 indicated a high problem in using modern fish production technology.

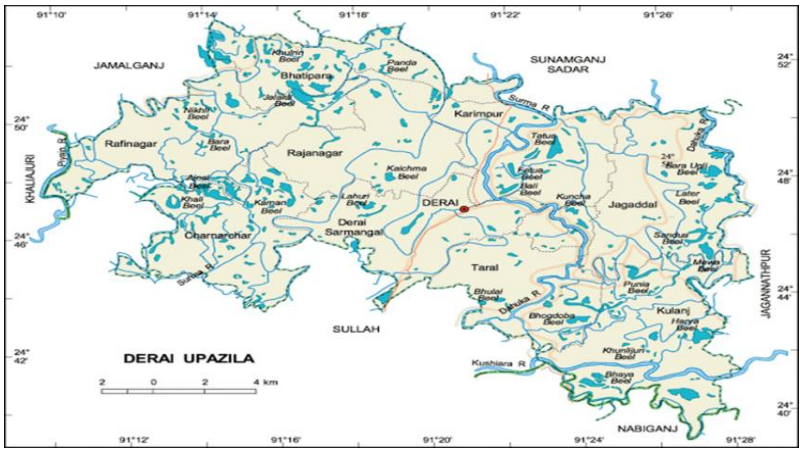


Fig 1: A map of Derai Upazila showing the study area of Rajanagar Union.

However, in order to ascertain the rank order of these problems, the individual Problem Level Index (PLI) was calculated using the following formula:

$$PLI = (P_n \times 0) + (P_l \times 1) + (P_s \times 2) + (P_m \times 3)$$

Where:

PLI = Problem Level Index
P_n = Number of farmers who had no problem at all
P_l = Number of farmers who had a less severe problem
P_s = Number of farmers who had a severe problem
P_m = Number of farmers who had the most severe problem

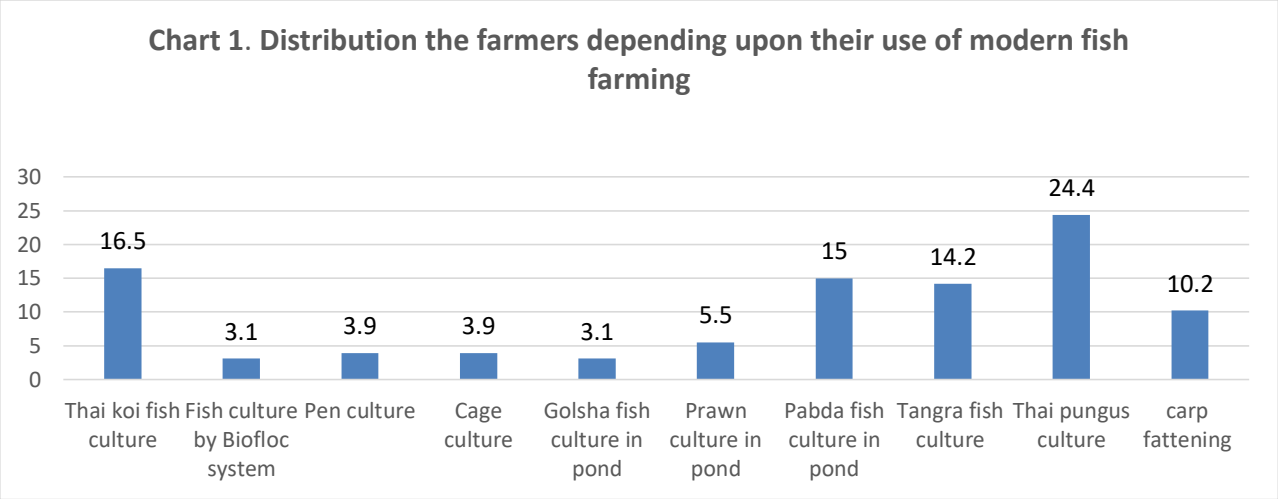
Collected data was compiled, coded, tabulated, and analyzed in accordance with the objectives of the study. The SPSS/PC + Computer programs were used to perform the data analyses. Statistical measures such as number, percentage distribution, range, mean, standard deviation, and rank order were used to describe the use of information media in fish production and the selected characteristics of the respondents. Pearson's product-moment correlation coefficient (r) was computed to find out the relationship between the selected characteristics of the farmers and their faced problems in using modern fish production technology.

Results and Discussion

Modern fish production technology involves the commercial breeding of fish by using innovative technology, usually for food, in fish tanks or artificial enclosures such as fish ponds. It is a particular type of aquaculture, which is the controlled cultivation and harvesting of aquatic animals such as fish, crustaceans, mollusks and so on, in a natural or pseudo-natural environment. The actual increase in production depends on the activities of the fish farmers and also the use of modern technology in fish production in our country. However, the adoption of modern fish production technologies by farmers is frequently barred by various factors that need to be eliminated urgently. Nonetheless, the efficiency of fisheries production has been a vital issue from the standpoint of agricultural improvement in developing countries since it provides pertinent information useful for drawing sound management decisions on resource allocations for creating agricultural policies and institutional improvements. Farmers in the local agriculture usually plan several adaptive exercises, but their relative effectiveness in handling these problems and primary variations eventually makes them more vindictive.

Use of modern fish production technologies by the farmers

Results revealed that 24.4% of fish farmers use Thai Pungus culture, 16.5% of fish farmers use Thai Koi culture, 15.0% of fish farmers use Pabda fish culture, 14.2% of fish farmers use Tengra fish culture, 10.2% of fish farmers use Carp fattening culture, 5.5% of fish farmers use Prawn culture, 3.9% of fish farmers use pen culture, 3.9% of fish farmers use cage culture, 3.1% of fish farmers use Biofloc system, 3.1% of fish farmers use Golsha fish culture.



The majority of the fish farmers use Thai Pungus culture, Thai Koi culture, Pabda fish culture, and Tengra fish culture. Sakib and Arafat (2014) reported that the majority of the farmers (61%) had high adoption of Pungus culture, and 42% had high adoption of Thai koi fish culture in their study area. It might be due to the fact that this type of fish farming is very easy and profitable. These types of fish have high demand in the market and are able to survive in adverse conditions. Diseases are less common in these types of fish. As a result, farmers are interested in farming these types of fish.

It also seems that only 3.9% of farmers are using Pen culture. It might be due to the fact that, in the case of Pen culture, there is a high demand for oxygen and water flow, dependence on artificial feed, the rapid spread of diseases, and also a risk of theft. Results also revealed that only 3.9% of farmers are using Cage culture. It might be due to the fact that the incidence of diseases is higher in Cage culture. Vandalism or poaching is another problem for fish farmers in the case of Cage culture. Only 3.1% of farmers use the Biofloc system because maintaining a Biofloc system is difficult than other systems.

Problems in practicing modern fish production technology

The scores for problems faced by the respondents in practicing modern fish production technology ranged from 16 to 26, with a mean of 20.33 and a standard deviation of 1.89. On the basis of encountered problems, fish farmers were classified into three categories, visually low problem, medium problem, and high problem. The distribution of the farmers according to the extent of problems in using modern fish production technology scores is shown in Table 1.

Table 1. Distribution of the farmers according to the extent of problems faced by them in using modern fish production technology

Categories	Respondents		Mean	Standard deviation
	Frequency	Percent		
Low problem (up to 18.44 scores)	6	15.0	20.33	1.89
Medium problem (18.45 to 22.22 scores)	30	75.0		
High problem (22.23 and above scores)	4	10.0		
Total	40	100.0		

Results revealed that an overwhelming majority (85%) of the fish farmers faced medium to high problems in practicing modern fish production technologies, while only 15% faced low problems in using these technologies. The major problems, according to fish farmers, were: the high price of fish feed, lack of supply of quality fish feed, lack of a system for ensuring reasonable prices of fish at the local market, and lack of proper understanding of farmers in using modern fish production technology, lack of adequate capital for fish farmers, an insufficient supply of good quality fingerlings, lack of good pesticides to prevent fish diseases, lack of good quality ice for fish preservation, hormonal reproduction leads to hereditary diseases, disrupting the increase of production and creating new species of fish by hybridization. Sheheli (2017) reported that the fish farmer faces some problems such as fish disease problems, over flood problem, high cost of fish feed and fertilizer, lack of market facilities, unavailability of quality seed and species, and lack of knowledge about fertilizer and fish feed application and so on.

Item-wise problem and level of severity perceived by the farmers

Table 2. Item-wise level of severity of the problem faced by farmers in practicing modern fish farming technologies

SL NO.	Problem items	Level of severity				PLI	Mean	RO
		Most severe (3)	Severe (2)	Less Severe (1)	Not at all problem(0)			
1	The supply of good quality fingerlings is less	15	23	1	1	92	2.3	**6th**
2	Lack of good pesticides to prevent fish diseases	3	20	17	0	66	1.65	**7th**
3	Disrupting in increase of production for creates new species of fish by hybridization	0	1	11	28	13	0.33	**10th**
4	Hormonal reproduction leads to hereditary diseases	0	2	31	7	35	0.88	**9th**
5	Lack of proper understanding of farmers in fish production in modern technology	28	10	2	0	106	2.65	**4th**
6	Lack of supply of quality fish feed	38	1	1	0	117	2.93	**2nd**
7	High price of fish feed	40	0	0	0	120	3.00	**1st**

8	Lack of good quality ice for fish conservation	2	3	35	0	47	1.18	**8th**
9	Lack of adequate capital for fish farmers	23	10	7	0	96	2.4	**5th**
10	Lack of system for ensuring the reasonable price of fish at a local market	33	7	0	0	113	2.83	**3rd**

From Table 2, it is clear that among these ten problems, the high price of fish feed got the first rank as the level of severity of the problem faced by farmers in practicing modern fish farming technologies, followed by the lack of supply of quality fish feed, lack of a system for ensuring a reasonable price of fish at the local market, lack of proper understanding of farmers in fish production in modern technology, lack of adequate capital for fish farmers, the supply of good quality fingerlings is low and so on. The disruption in production to create new species of fish by hybridization was ranked last by the farmers as the level of severity of the problem faced by farmers in practicing modern fish farming technologies.

Fish feed costs increase day by day due to increasing raw material prices. As a result, fish farmers face a hard problem in fish production. It could be overcome by using alternatives to fishmeal, such as plant-based feedstuffs. The use of plant-based feeds in fish production is sustainable (Joseph, 2013). Plant-based feeds such as soybeans, rapeseed, corn gluten, wheat gluten, pea and lupin meals, palm oil, soybean oil, and maize oil can be used as fish feed instead of high-priced commercial fish feed.

Most farmers use commercial fish feed for fish production. It might be due to the fact that commercial fish feed is easily available and less labor-intensive. However, the quality of homemade feed is better than commercial feed (Rahman et al., 2020). Poor quality feeds affect the growth and health of fish and also help develop various diseases. Regarding this issue, strict quality control measures should be undertaken by the different commercial fish feed manufacturers to increase fish production in the Haor area.

Most of the fish farmers are bound to sell their fish to the Beparies/Aratdar/Middlemen/Retailers at a very low price due to high transportation costs and a lack of freezing facilities. Pravakar (2013) conducted a study entitled "Present Status of Fish Farming and Livelihood of Fish Farmers in Shahrasti Upazila of Chandpur District, Bangladesh" and reported that almost 80 percent of the fish were sold by the farmers to local paikers. As a result, fish markets are controlled by the retailers group. As a result, fish farmers cannot negotiate favorable prices for themselves. This problem could be minimized by improving storage facilities, transportation facilities and the dissemination of marketing information by the Department of Fisheries.

Most of the fish farmers lacked sufficient knowledge and experience in modern fish production technology, and as a result, they were unable to perform their duties effectively. As a result, they are facing problems regarding modern fish production technology. Hence, an awareness campaign, field days, demonstrations, exhibitions, and modern fish culture techniques could be organized to develop a proper understanding of modern fish production technology (Goswami, 2011).

In our country, most of the fish farmers are poor. The lack of adequate capital for fish production is another severe problem for them. Moreover, there is no compensation facility for any loss. Government and non-government organizations can take the necessary steps to solve this problem by increasing soft loan facilities for fish farmers with a low-interest rate.

Characteristics Profile of the Fish Farmers

In this study, 6 (six) characteristics of the fish farmers were selected as independent variables. These were: age, educational qualification, family size, fish farm size, extension media contact, and knowledge about modern fish production technology. A summary of the analyzed results for the selected characteristics (independent variables) of the pineapple growers has been presented in Table 3.

Table 3. Salient features of the selected characteristics of the fish farmers

Characteristics (units)	Range		Growers		Mean	Standard Deviation
	Possible	Observed	Categories	Percent		
Age (year)	Unknown	27-61	Young (up to 35)	75.0	34.95	9.24
			Middle age (36 – 55)	12.5		
			Old (Above 55)	12.5		
Education (year of schooling)	Unknown	2-17	Primary (1-5)	22.5	9.55	4.44
			Secondary (6-10)	32.5		
			Higher secondary (11-12)	5.0		
			Graduation (13th and above)	40.0		
Family size (number)	Unknown	4-14	Small family (up to 4)	20.0	7.88	2.96
			Medium family (5-6)	15.0		
			Large Family (above 6)	65.0		
Fish Farm Size (ha)	Unknown	0.13-6.99	Small (Up to 1.0 ha)	2.5	3.56	1.84
			Medium (1.01-3.0 ha))	45.0		
			Large (above 3.0 ha)	52.5		
Extension contact (Scores)	0-30	8-18	Low contact (Up to 9.68)	17.5	12.97	3.29
			Medium contact (9.69 to 16.26)	60.0		
			High contact (16.27 and above)	22.5		
Knowledge about modern fish farming (Scores)	0-30	6.5-15	Low knowledge (up to 8.44)	12.5	10.54	2.10
			Medium knowledge (8.45 to 12.64)	77.5		
			High knowledge (12.65 and above scores)	10.0		

The findings indicated that a large proportion (75 percent) of the fish farmers were young aged compared to 12.5 percent middle and 12.5 percent old aged, respectively. The majority (40 percent) of farmers had graduate degrees followed by 22.5 had primary, and 32.5 had secondary education, respectively. The majority (65 percent) of the growers had a large family. The average fish farm size was 3.56 hectares which is higher than the national average farm size which is equivalent to 0.80 hectares (BBS, 2007). A major portion (60 percent) of the fish farmers had medium extension contact, and only 17.5 percent had low extension contact. Results also revealed that the majority (77.5 percent) of the fish farmers had medium knowledge of modern fish farming technology.

Relationship between the selected characteristics of farmers and their faced problems in using modern fish production technology

Pearson's product-moment correlation coefficient (r) was computed in order to explore the relationship between the selected characteristics of the farmers and their problems in using modern fish production technology. It indicates which of the characteristics of the farmers has a significant relationship with their problems in using modern fish production technology.

The summary of the coefficient of Correlation indicating the relationship between selected characteristics of the growers and their knowledge about pineapple cultivation has been presented in Table 4.

Table 4. Correlation co-efficient between the selected characteristics of the fish farmers and their problems in using modern fish production technology

Dependent variable	Independent variables	Correlation co-efficient 'r' values with 38 df	Tabulated value of 'r'	
			0.05 level	0.01 level
Problems in using modern fish production technology	Age	0.042^{NS}	0.312	0.403
	Level of education	-0.349*		
	Family size	-0.167^{NS}		
	Farm size	-0.378^{*}		
	Extension media contact	-0.515^{**}		
	Knowledge about modern fish production technology	-0.675^{**}		

** Correlation is significant at the 0.01 level, *Correlation is significant at the 0.05 level, NS= Non significant relationship

The findings demonstrate that the age and family size of farmers had no significant relationship with farmers' problems in using modern fish production technology. In their level of education (-0.349*), farm size (-0.378*), extension contact (-0.515**), and knowledge (-0.675**) had a negatively significant relationship with the perceived problems of modern fish production technology. Education helps to gather more knowledge from farmers. It also improves a farmer's ability to learn new things and provides them with greater access to information and opportunities than others, potentially increasing their capacity to solve problems with modern fish production technology. Khan (1986) reported that the level of education largely affects the utilization of water resources by farmers. Pravakar (2013) concluded that education helps to increase the awareness of farmers about various problems. Extension contact pertains to one's contact with multifarious sources of modern fish production technology. This results in a cognitive change in the fish farmers, with an eventual change in behavior and skill. Modern fish production requires technological knowledge from the farmers that can be partially fulfilled if they come into contact with more sources of information. Knowledge about modern fish production helps farmers take the necessary steps regarding fish production. Modern knowledge also helps to bring more production and profit by using modern fish production technology. Alam et al. (2017) reported that the knowledge of the fish farmers had a significant positive relationship with the amount of aquaculture training received. Sakib and Arafat (2014) reported that age, education, use of information sources, farm size, fish farming area, annual family income, commercialization, social participation, and innovativeness had positive and significant relationships with the adoption of modern aquaculture technologies. Government and non-governmental organizations (NGOs) should organize various types of training programs on modern fish production technology to improve the knowledge levels of fish farmers.

Since the profit of fish farming through using modern technology is determined by the quality of fingerling and fish feeds which were found scarce and cost-intensive to the Haor farmers - most of the modern technologies were abandoned despite having all potential for increased production. So, extension agencies, policymakers, and government and non-government credit providers should come forward to make available quality fingerling and fish feed at the doorstep of the fish farmers. Low-interest rate loans in this regard may have a substantial impact in reversing the poor adoption rate of modern fish production technology by the fish farmers of the haor area.

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