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Article

Attitude of farmers towards Pangas farming for their livelihood improvement

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Abstract: The present study was conducted in the selected Malotipur village of Muktagachha upazila under Mymensingh district during 13 to 28 April, 2014. The sample size of the study was 90 fish farmers (43 percent of population) and it was drown from a population of 209 using simple random sampling technique. Eight (8) selected characteristics of farmers viz.: age, level of education, family size, farm size, annual income, credit received, training experience and cosmopoliteness were considered as the independent variables, while the attitude of the farmers towards Pangas farming was the dependent variable of the study. The focus variable i.e. attitude of farmers towards Pangas farming was measured with a 5 point likert scale such as 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree' in Pangas farming and the corresponding scores were 5, 4, 3, 2 and 1 respectively. The findings indicated that the majority (50 percent) of the Pangas farmers had moderately favorable attitude towards Pangas farming compared to 31.1 percent having highly favorable and only 18.9 percent had slightly favorable attitude. The finding on problem faced by the farmers related to Pangas farming revealed that about two-third (65.6 percent) of the farmers had high problem followed by 20 percent low problems. Among eight selected characteristics of Pangas farmers five characteristics such as age, level of education; annual income, training experience and cosmopoliteness had significant positive relationships with their attitude towards Pangas farming. On the other hand, the other two characteristics of pangas farmers such as family size and farm size had positive but no significant relationships with their attitude towards Pangas farming.

Keywords: Pangas farming; fisheries scenario; attitude; livelihood; economic condition

1. Introduction

Aquaculture is one type of agricultural activity, which can be called a "water-based farming system". Bangladesh is uniquely endowed with diverse, rich aquaculture and fisheries resources. Most of the country is made up of floodplain, and while the alluvial soil provides good arable land, large areas are at risk because of frequent floods and cyclones, which take lives and destroy crops, livestock and property. The over dependence on land and acute scarcity of land in the country are the main causes of poverty in the rural areas. A low estimate of 20 percent of the rural poor is in chronic poverty. They suffer from persistent food insecurity, own no land and assets are often uneducated and may also suffer serious illnesses or disabilities (Faruque, 2013). Another 29 percent of the rural population is considered as moderately poor. Though they own a small plot of land and some livestock and generally have enough to eat their diets lack nutritional values (BBS, 2011).Forty five percent (45 percent) population in Bangladesh are below poverty line (BBS, 2011). Aquaculture for poverty reduction and food security is developing fast, but not always in ways promoted by many development agencies.

Rather than being a means to secure nutritional gains and income directly for the poorest smallholder farmers, it is increasingly a means to increase domestic fish supply to low-income consumers, develop opportunities for employment and support local economic multipliers and to generate revenue from trade (Belton *et al.*, 2011). This mix of small-scale and larger-scale aquaculture parallels developments in agriculture, where calls for support to smallholders co-exist with support for commercialization of agriculture to accelerate its role in promoting macroeconomic growth (Wiggins *et al.*, 2010). The total annual fish production in Bangladesh was estimated to be3.06 million tons in 2010-11, of which 1.46 million tons (48 percent) were obtained from inland aquaculture, 1.05 million tons (34 percent) from inland capture fisheries and 0.55 million tons (18 percent) from marine fisheries (DoF, 2012). Within a decade, fish production has increased from 1.78 million tons in 2000-01 to 3.06 million tons in 2010-11. Overall, fisheries sector plays an important role in the economy of Bangladesh, providing food, nutrition, incomes, livelihoods and export earnings (Dey *et al*., 2010; Jahan *et al*., 2010; Belton *et al*., 2011). Mymensingh is ranked first among districts of pond fish production in Bangladesh, producing 218,952 tons per annum and contributes 18 percent of total pond production in Bangladesh (DoF, 2012). Small-scale aquaculture is expanding rapidly in the Mymensingh area where a large number of farmers are involved. There are 0.14 million farmers involved in aquaculture with an area of 28,889 ha in 2010 which compares 60,000 farmers with 15,421 ha of culture area in 1980. A total of 145,428 fish ponds were estimated in 2010 with an average pond size of 0.20 ha. Pond size was larger in the past, averaging 0.25 ha more than three decades ago. The average annual fish yield was estimated at 7.58 tons/ha in 2010, compares with 3.27 tons/ha in 1980. Total annual fish production has increased from 50,427 tons in 1980 to 218,952 tons in 2010 (DoF, 2012). Pangas has been emerging as an economically very important species to South-East Asian countries. Commercial farming of Pangas, introduced from Thailand started about in 1998 and expanded rapidly after 2000 in Mymensingh district. In Mymensingh region, Pangas farming has been established rapidly. While Mymensingh remains the lead producing area, its farming was also expanded to other parts of the country particularly in Bogra, Jessore, Noakhali and Dhaka. Over the last 15 years, Pangas farming evolved a shape of commercial enterprise. Pangas is presently being cultured in about 30,000 ha area of water body and a large number of people are associated with this enterprise (Islam, 2009). Pangas is particularly important for their fast growth, lucrative size, good taste, high market demand and can be stocked at a much higher density in ponds compared to other culturable species. Islam (2009) reported that Pangas is one of the most suitable fish for rearing in ponds and cages. Pangas farming is very important to fulfill nutritional requirement and to generate livelihood opportunities of poor people. They are improving their social and economic condition through Pangas farming. Pangas farming is profitable but lack of sufficient fund, high price of input, lack of marketing facilities, lack of scientific and technical knowledge, less availability of fish seed, high cost of feed, water shortage in dry season and socio-economic constrains (Robbani, 2002; Akter, 2001). The main objectives of the present study was to determine the attitude of farmers towards Pangas farming for their livelihood improvement; to estimate and describe some selected characteristics of Pangas farmers. The characteristics are age, level of education, family size, farm size, annual income, credit received, training experience and cosmopoliteness; toexplore the relationships between the selected characteristics of Pangas farmers and their attitude towards Pangas farming for their livelihood improvement and to determine the problems faced by the farmers in Pangas farming.

2. Materials and Methods

2.1. Study area and period

The study was conducted at Kumargata union of Muktagachha upazila under Mymensingh district. One union namely Kumarghata was selected purposively as a study location. There were 11 villages in Kumarghata union and out of these villages; Malotipur village was purposively selected for the study (Figure 1). There were 209 fish farmers in the study area who were considered as the population of the study. From the total population, 90 fish farmers (43% of population) were selected randomly as sample of the study following simple random sampling technique.

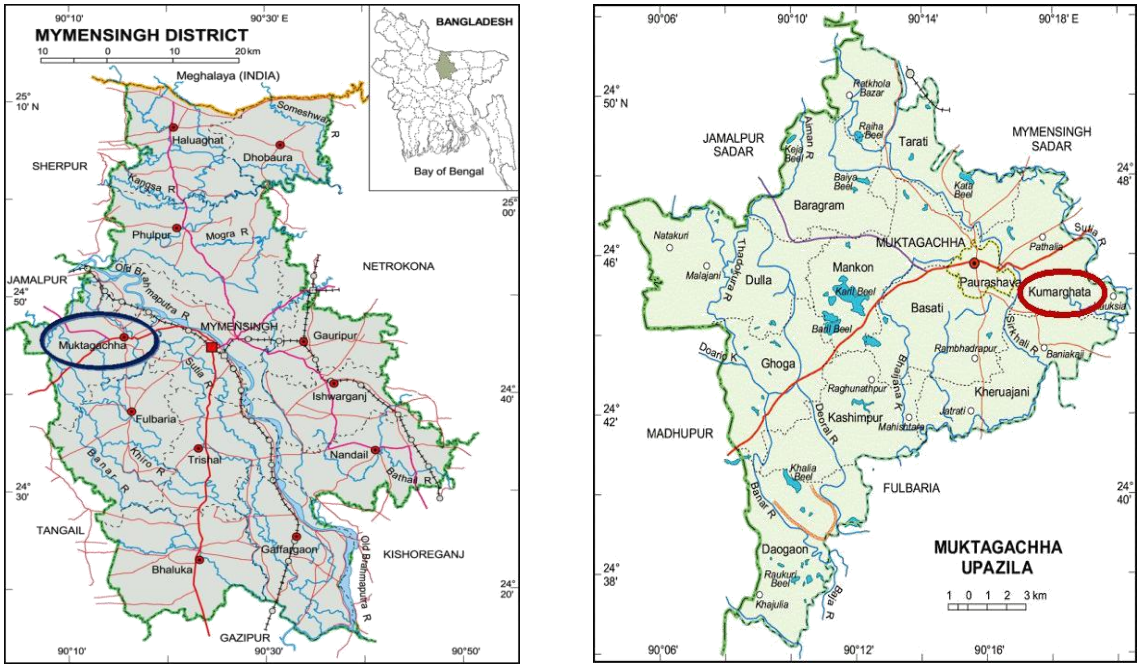

Figure 1. A map of Mymensingh district and Muktagachha upazila showing the study area (Kumarghata union).

2.2. Rationale for the research site

This village was purposively selected because the fact that Pangas farming of this area was higher than other areas of Muktagacha upazila. The selection was made on the basis of suggestions made by Upazila Fisheries Officer (UFO) of Muktagacha upazila. Pangas has long been traditional practiced by fish farmers in Muktachha upazila. Currently most of farmers (60 percent) are involved in Pangas farming; while only 40 percent of farmers are practiced in others fish farming. About 40 percent of farmers are involved in extensive farming, while 35 percent and 25 percent practice improved extensive and semi-intensive farming, respectively. Muktagachha is one of the most important places for Pangas farming in Bangladesh. Pangas is the most dominant species in Mymensingh, accounting for 54% of the total aquaculture production. Traditionally Indian major carps, such as Catla, Mrigel and Rohu have long been cultured in the study area, accounting for 26 percent of the total aquaculture production. Exotic Carps, such as Common carp, Grass carp and Silver carp have also been cultured those contribute 8 percent to aquaculture production. Climbing perch and Tilapia has recently been cultured in Muktagachha upazila and account for 6 percent and 3 percent of the total aquaculture production, respectively (Table 1).

Table 1. Percentage of fish species cultured in Muktagachha.

Species of Fish	Share of Cultivation (%)
Pangas	60.00
Carps (rui, katla, mrigel, silver carp)	35.00
Thai Koi	2.00
Tilapia (GIFT and monosex)	1.50
Shrimp	0.20
Puti (Rajputi and Shorputi)	0.50
Others	0.80
Total	100.00

Source: Upazila Fisheries Office (official data, 2014), Muktagachha; Mymensingh.

2.3. Basic features of the study areas

A) Physical features: The selected area is situated under Muktagachha upazila. The distance of Muktagachha upazila is 21 kilometres from Mymensingh district town. The study area is well connected with the

Mymensingh town with an asphalted road. Bus, CNG, auto rickshaw, bicycle and motorcycle are the main transports of these unions. The houses of the study area are mostly made of tin, bamboo and straw but some tin shed brick houses also found in these unions. Majority of the houses have no sanitary latrines and most of the people are indifferent to use sanitary latrines. Almost in every house, there is at least one pond that is used for fish culture.

B) Fisheries scenario: Aquaculture is the main issue for the livelihood of the villagers. In agricultural activities farmer grows different types of crops like rice, wheat, jute, mastered, spices and various types of vegetables. The total cultivated land 3000 acres. In case of aquaculture activities the fish farmer mainly commercially culture Carp, Tilapia, Shing, Magur and Pangas. The total area of water body is 20,193 acres (Table 2).

Table 2. Numbers of farmers and their average farm size of the major Pangas producing upazila in Mymensingh district.

Upazila	Number of farms	Mean farm size (ha)	Total farm area (ha)
Muktagacha	2480	1.50	3720
Trishal	1720	1720	2580
Bhaluka	1300	6.00	7800
Total	5500	N/A	14 100

Source: Upazila Fisheries Office (official data, 2013), Muktagachha; Mymensingh.

C) Socio-economic condition: The village society is mainly stratified into four social classes, namely rich, middle class, poor and very poor. Among the social institutions, there is only one primary school in study area (Table 3).There is one separate samitee. The major social problems are solved by the chairman and members of the union parishad. Sometimes people go to the court to solve their major social conflicts. Minor social problems of the villages are mainly solved by the local elites (e.g. village heads, educated people and school teachers). The non-agricultural income sources of the villagers are mainly business, day labouring and rickshaw polling. The socio-economic condition of this union is very well.

Table 3. Major features of the study areas.

Area	1.284 Sq Km	
Total Population	Male 1107	Total: 2243
	Female 1136	
Total Households	439	
Total Fish Farmer	209	
Total Pond	584	
Literacy Rate	35.34%	
Primary School	1	
Madrasa	3	
Total Water bodies	201.93 hec.	

D) Interventing agencies: Some development activities are being done by the GOs and NGOs like World Vision, Proshikha, BRAC, Grameen Bank, ASA etc. These organizations provide training and credit facility to the poor people so, that they can improve their livelihoods.

2.4. Sampling design

Updated lists of all the fish farmers were collected from the Upazila Fisheries Officer (UFO) in Muktagachha upazila. The farmers who practiced Pangas farming on that study area were the population for this study. However, data were collected from a sample rather than the whole population. The total populations were 209, out of which 43 percent population were selected as sample by using a table of random numbers. Ninety (90) Pangas fish farmers were randomly selected.

2.5. Methods and Procedures of Data Collection

2.5.1. The survey

In the survey, two trained enumerators along with the researcher himself collected data from 90 Pangas fish farmers through personal interviewing. The researcher first established rapport with the respondents and clearly

explained the objectives of the study using local language as far as possible. As a result, the respondents furnished proper response to the questions without any hesitation. The questions were clarified whenever any respondent had difficulties in understanding. Excellent cooperation was received from the respondents and other people of the study area. No serious difficulty was faced by the researcher in collecting data. The survey was conducted in April, 2014.

2.6. Measurement of the variables

2.6.1. Independent variables

The independent variables of the study were age, level of education, family size, farm size, annual income, credit received, training experience and cosmopoliteness. Procedures for measuring independent variables have been discussed as follows:

2.6.1.1. Age

The age of a respondent was measured in terms of actual years from her birth to the time of interview on the basis of Pangas farmer's statement. A score of one (1) was assigned for each year of his age.

2.6.1.2. Level of education

The level of education of a respondent was measured by the level of education completed as indicated by his response to item no. 2 of the interview schedule. A score of one (1) was assigned for each level of education completed. If a respondent did not know how to read and write, his level of education score was considered as zero (0), 1 for class one, 2 for class two and so on.

2.6.1.3. Family size

The household size of a respondent was measured in terms of actual number of members in his family including himself, his wife, children, brothers, sisters, parents and the person who jointly live and eat together during interviewing.

2.6.1.4. Farm size

Farm size of a respondent was measured as the size of his farm (including Pangas farming and other crops) on which he continued his farm practices during the period of study. Each respondent was asked to mention the homestead area, the land under his own cultivation, land given to others on borga, land taken from other on borga, land taken from others on lease system and others land (for poultry rearing).

The following formula was used in measuring the farm size:

$$\text{Farm size (FS)} = F_1 + F_2 + {}^1/_2(F_3 + F_4) + F_5 + F_6$$

Where,

F_1 = land under homestead

F_2 = own land under own cultivation

F_3 = land given to others on borga

F_4 = land taken from others on borga

F_5 = land taken from others on lease/mortgage and F_6 = others land.

2.6.1.5. Annual income

Income from fish culture of a respondent was measured in Taka on the basis of his/her response in terms of the last one year's income only from fish culture. Income from fish culture of a respondent was expressed in Tk. A score of one was given for each Taka 1,000 to compute the annual income scores of the respondents.

2.6.1.6. Credit received

Credit received of a respondent was measured in terms of amount of money received by him as loan from different sources. It was expressed in Taka. A score of one (1) was given for each thousands of Taka.

2.6.1.7. Training experience

Training experience was determined by total number of days of training received by the Pangas farmers from any organization in their entire lifetime. If a respondent took 3 days training on Pangas farming from GOs, NGOs or any other organization then his training experience score was 3 and so on.

2.6.1.8. Cosmopoliteness

It referred to the degree to which an individual is orientated to the places external to his social system. Cosmopoliteness was score was computed on the basis of extent of visit of a respondent in seven selected places for the purpose of fish culture. The extent of the social mobility was determined with a five point rating scale 3 for frequently, 2 for occasionally, 1 for rarely and 0 for not at all. Total score of a respondent was measured by summing of all individual score. The score could range from 0 to 21, where 0 indicated no cosmopoliteness and 18 indicated maximum cosmopoliteness.

2.6.2. Dependent variable

Attitude of farmers towards Pangas farming for their livelihood improvement was the dependent variable. This variable was operationalized through a 5 point Likert Scale. Twenty five (25) statements on various aspects of Pangas cultivation were asked to the farmers. The positive and negative statements were arranged randomly in the schedule in order to achieve the real picture of attitude of the farmers. They were asked to indicate for each of the statements, whether they 'strongly agree', 'agree', 'undecided', 'disagree', 'strongly disagree' with a corresponding score of 5, 4, 3, 2 and 1 for the positive items and vice versa for the negative items. The attitude score of a farmer was computed by summing the scores for his responses to all the items. Hence, scores of a farmer could range from 25 to 125; 25 indicate highly unfavorable attitude and highly favorable 125 favorable attitudes towards Pangas farming. For clearer understanding of the statements used to measure farmers‟ attitude, the statements were placed in ranked order based on their respective means.

2.7. Measurement techniques of problem faced by the pangas farmers

Pangas farmers‟ problems on Pangas farming was measured by developing 12 problematic statements. Scores were assigned for 3, 2, 1, 0 according to the extent of problem faced i.e. high, medium, low and not at all, respectively. An overall problem faced score was computed for each respondent by adding problem conformation scores in all 12 statements.Thus, possible score may vary from 0 to 36, while zero indicated no problem and 36 indicated the highest level of problem. Problem faced index will be computed using the following formula:

$PFI = (P_h \times 3) + (P_m \times 2) + (P_1 \times 1) + (P_n \times 0)$

Where,

P_h = Percentage of respondents with “high problem”

P_m = Percentage of respondents with “medium problem”

P_1 = Percentage of respondents with “low problem”

P_n = Percentage of respondents with “not at all problem”

2.8. Data processing and analysis procedure

Qualitative data were converted into quantitative forms by means of suitable scoring technique whenever necessary. The analysis was performed by using statistical treatment with SPSS (Statistical Package for Social Sciences) computer package. To explore the relationship among the variables concerned, Pearson's Product Moment Correlation Coefficient (r) was computed. Five percent (5%) level of probability was employed in order to accept or reject the null hypotheses.

3. Results and Discussion

3.1. Selected characteristics of the Pangas farmers

3.1.1. Age

The age of the Pangas farmers ranged from 25 to 57 years, the average being 43.84 and standard deviation of 7.86. Based on their age, the Pangas farmers were classified into three categories viz. young, middle and old aged as shown in Table 4. Approximately more than half proportion of the farmers (61.1 percent) was middle-aged, compared to 18.9 percent of them being young and 20 percent being old. The findings, thus, indicate that a large proportion (81.1 percent) of the Pangas farmers were middle to old aged. Middle and old aged farmers might have valuable opinions in Pangas farming practices. The extension agents can make use of these views and opinions in designing their extension activities. Young people are generally receptive to new ideas and things. They would have a favorable attitude. Ahmed (2013), Ahmed (2010), Sharmin (2008), Parvez (2007) and Ahmed (2006) found almost similar distribution of respondent in different age categories in their respective studies.

Table 4. Salient features of the selected characteristics of the Pangas farmers (N = 90).

Characteristics	Measuring unit	Range	Categories	Respondent		Mean	SD
		Observed (possible)		Number	Percent		
Age	Actual years	27-57 (Unknown)	Young (18- 35)	17	18.9	43.84	7.86
			Middle age (36-50)	55	61.1		
			Old (above 50)	18	20		
Level of education	Formal education	0-16 (Unknown)	Illiterate (0)	21	23.3	5.42	3.97
			Primary (1-5)	35	38.9		
			Secondary (6-10)	23	25.6		
			Above secondary (above 10)	11	12.2		
Family size	No. of family members	3-10 (Unknown)	Small (up to 4)	6	6.7	6.26	1.45
			Medium (5-8)	78	86.7		
			Large (above 8)	6	6.7		
Farm size	Hectares	0.20-6.06 (Unknown)	Small (0.20-1.0)	39	43.3	1.35	1.01
			Medium (1.01-3.0)	45	50.0		
			Large (above 3.0)	6	6.7		
Annual income	„000‟TK	96-1000 (Unknown)	Low (up to 150)	16	17.8	2.43	160.01
			Medium (151-500)	69	76.7		
			High (above 500)	5	5.6		
Credit received	„000‟TK	0-210 (Unknown)	No credit received (0)	40	44.4	46.77	58.95
			Low (up to 70)	19	21.1		
			Medium (71-140)	22	24.4		
			High (above 140)	9	10.0		
			No training experience (0)	56	62.2		
Training experience	Days	0-10 (unknown)	Low (up to 4)	training experience	12	13.3	
			Medium training experience (5-8)	17	18.9	2.14	3.42
			High (above 8)	training experience	5	5.6	
			No cosmopoliteness (0)	29	32.2		
Cosmopoliteness	Score	0-6 (0-21)	Low (up to 6)	61	67.8	2.33	2.01
			Medium (7-12)	0	0		
			High (above 12)	0	0		

3.1.2. Level of education

The level of education of the Pangas farmers ranged from 0 to 16 with an average being 5.42 and standard deviation of 3.97. Based on the level of education score the respondents were classified into four categories viz. illiterate, primary, secondary and above secondary. Table 4 shows that a large proportion of the Pangas farmers (38.9 percent) were primary compared to 25.6 percent having secondary education, 23.3 percent having secondary education and 12.2 percent having above higher secondary education. The literacy rate of the country is 67 percent (BBS, 2013). Thus, the findings indicate that in the area the literacy rate seems to be lower than that of national average.

3.1.3. Family size

Family size of the respondents ranged from 3-10, with an average of 6.26 and standard deviation of 1.45. On the basis of their household size, the Pangas farmers were classified into three categories as small, medium and large. Table 4 shows the distribution of the Pangas farmers according to their family size. Data contained in

Table 4 show that majority of the Pangas farmers (86.7 percent) had medium sized household where, 6.7 percent had both small and large household. Hossain (2010) and Burhan (2009) found average family size 5.50 to 6.92, respectively which were almost similar to this study.

3.1.4. Farm size

The farm size of the Pangas farmers varied from 0.20 to 6.06 hectares. The average farm size was 1.35 hectare with a standard deviation of 1.01. Based on the farm size, the Pangas farmers were divided into three categories viz. small, medium and large. The distribution of the Pangas farmers has been shown in Table 4. Data indicate that the highest proportion of the respondents (50 percent) fell in medium farm size category compared to 43.3 percent and 6.7 percent of them small and large farm size, respectively. The average farm size of the respondents was 1.35 hectares which is higher than national average (0.81 ha). This might indicate that the situations of the Pangas farmers regarding farm size in the study area are better than a typical farming community of Bangladesh. Similar findings were reported by Ahmed (2010).

3.1.5. Annual income

Annual income of the Pangas farmers ranged from Tk. 96 to 1000 thousand, the average being 2.43 and standard deviation 160.01. Based on their income score, the Pangas farmers were classified into three categories: low income, medium income and high income categories. The distribution of the Pangas farmers according to their family income is shown in Table 4. Data indicate that about three fourth of the respondents (76.7 percent) had medium income where, 17.8 percent and 5.6 percent of them had annual income of low and high category, respectively.

3.1.6. Credit received

Credit received scores of the Pangas farmers ranged from 0 to 210 TK, the average being 46.77 and standard deviation 58.95. Based on their credit received scores, the Pangas farmers were classified into four categories: no credit receiver, low credit receiver, medium credit receiver and high credit receiver. The distribution of the Pangas farmers according to their credit availability is shown in Table 4.The highest proportion of the Pangas farmers (44.4 percent) did not receive any credit, while 21.1 percent of them were low credit receiver, 18.9 percent and 15.6 percent of the farmers were medium and high credit receivers, respectively. Similar findings were reported by Ahmed (2013).

3.1.7. Training experience

Training experience of the respondents ranged from 0 to 10 days with average of 2.14 and standard deviation 3.42. On the basis of training experience, respondents were classified into four categories as no training experience, low training experience, medium training experience and high training experience respectively. The distribution of the respondents according to their training experience is shown in Table 4. Data indicate that the majority proportion of the respondents (62.2 percent) had no training, while 18.9 percent had medium training experience, 13.3 percent had low training experience and 5.6 percent had high training experience. Data indicates that majority of the respondents did not participate in any training program because respondents do not get proper opportunity to receive training. Similar findings were reported by Ahmed (2006) and Ahmed (2010).

3.1.8. Cosmopoliteness

Cosmopoliteness scores of the respondents ranged from 0 to 6. The average and standard deviation was 2.33 and 2.01, respectively. On the basis of cosmopoliteness scores, the respondents were classified into four categories: no cosmopolite, low cosmopolite, medium cosmopolite and high cosmopoliteness. The distribution of the respondents according to their cosmopoliteness is shown in Table 4. Data presented in Table 4 indicate that the majority of the respondents (67.8 percent) were low cosmopolite compared to 32.2 percent were no cosmopolite. The value indicates that thefish farmers of the study area contain low to medium social mobility.

3.2. Attitude of the farmers towards Pangas farming

Farmer‟s attitude towards Pangas farming was the main focus of the study. Attitude scores of the Pangas farmers varied from 76 to 108 against the possible range from 25 to 125, with an average of 93.95 and standard deviation 10.72. Based on the observed attitude scores, the respondents were classified into three categories as shown in Table 5. The findings indicates that overwhelming majority of the Pangas farmers (50 percent) had moderately favorable attitude towards Pangas farming compared to only 31.1 percent having highly favorable

and only 18.9 percent had slightly favorable attitude.

Table 5. Distribution of the Pangas farmers according to their attitude towards Pangas farming.

Categories	Pangas Farmers (N=90)		Mean	SD
	Number	Percent		
Slightly favorable attitude (76-90)	17	18.9	93.95	10.72
Moderately favorable attitude (91-105)	25	50.0		
Highly favorable attitude (above 105)	58	31.1		
Total	90	100		

3.3. Relationship between selected characteristics of Pangas farmers and their attitude towards Pangas farming

The purpose of this section is to explore the relationships between each of the selected characteristics of the farmers and their attitude towards Pangas farming. The relationship between the selected characteristics of the farmers and their attitude towards Pangas farming is presented in Table 6. Pearson's Product Moment Correlation Co-efficient 'r' was used to test the null hypotheses concerning relationships between any two variables. A null hypothesis was rejected when the observed r value was equal or greater than the table value of r at 0.05 levels of probability. Out of eight variables, the relationships of four variables with farmers‟ attitude were significant and positive and three were non-significant.

3.3.1. Age and attitude

The relationship between age of the Pangas farmers and their attitude towards Pangas farming for their livelihood improvement was measured by testing the null hypothesis, i.e. "there is no relationship between age of the Pangas farmers and their attitude towards Pangas farming".

Table 6. Result of correlation analysis between selected characteristics of Pangas farmers and their attitude towards Pangas farming.

Dependent variable	Characteristics of farmers	Correlation of coefficient 'r' value with 88 d.f.
Attitude of farmers towards Pangas farming	Age	0.800**
	Level of education	0.234*
	Family size	0.207^{NS}
	Farm size	$0. 017^{NS}$
	Annual income	0.266*
	Credit received	$-.044^{NS}$
	Training experience	0.338**
	Cosmopoliteness	0.376**

NS = Not significant
* = Significant at 0.05 level of probability (2 tailed)
** = Significant at 0.01 level of probability (2 tailed)

The calculated value of r (0.800**) was greater than the table value of r (0.270) with 88 degrees of freedom at 0.01 level of probability (Table 6). Based on the above findings, the null hypothesis was rejected and it was concluded that age of the Pangas farmers had significant and positive relationship with their attitude towards Pangas farming. So, age of the Pangas farmers had influence to form favorable attitude towards Pangas farming. Ahmed (2006) and Ahmed (2013) also observed similar relationship in their respective studies.

3.3.2. Level of education and attitude

The relationship between level of education of the farmers and their attitude towards Pangas farming was measured by testing the null hypothesis, i.e. "there is no relationship between years of schooling of the Pangas farmers and their attitude towards Pangas farming".

The calculated value of r (0.234*) was greater than the table value of r (0.195) with 88 degrees of freedom at 0.05 level of probability (Table 6). Based on the above findings, the null hypothesis was rejected and it was

concluded that education of the Pangas farmers had significant and positive relationship with their attitude towards Pangas farming. Rahman (2010) found that level of education of the respondents had significant relationship with their aquaculture practices and which was in positive direction. The findings had consistency with Habib (2000), Faruque (2007) and Jakir (2010) as well.

3.3.3. Family size and attitude

Using the null hypothesis, i.e. "there is no relationship between family size of the Pangas farmers and their attitude towards Pangas farming". The relationship between family size of the Pangas farmers and their attitude towards Pangas farming was tested. The calculated value of r (0.207^{NS}) was smaller than the table value r (0.207) with 88 degrees of freedom at 0.05 levels of probability (Table 6). So the concerned null hypothesis could not be rejected and it was concluded that the family size of the members had no significant relationship with their attitude towards Pangas farming. Rahman (2010) also found that there was no significant relationship between household size and attitude of fish farmers. The findings had consistency with Roy (2003), Pal (2009) and Biswas (2009).

3.3.4. Farm size and attitude

The relationship between farm size of the Pangas farmers and their attitude towards Pangas farming was studied by testing the concerned null hypothesis, i.e. "there is no relationship between farm size of the Pangas farmers and their attitude towards Pangas farming". The calculated value of r (0.017^{NS}) was smaller than the table value r (0.195) with 88 degrees of freedom at 0.05 levels of probability (Table 6). So the concerned null hypothesis could be rejected and it was concluded that the farm size of the farmers had no significant relationship with their attitude towards Pangas farming. These findings clearly indicate that there was a negative trend between farm size of the Pangas farmers and their attitude towards Pangas farming. Noor (1995), Ahmed (2006) and Ahmed (2013) also found similar results in their respective studies.

3.3.5. Annual income and attitude

The relationship between annual income of the Pangas farmers and their attitude towards Pangas farming was examined by testing the concerned null hypothesis, i.e. "there is no relationship between annual income of the Pangas farmers and their attitude towards Pangas farming". Calculated value of r (0.266*) was being significant at 0.05 level of probability (Table 6). So, the null hypothesis rejected. It was, therefore, concluded that annual income of the Pangas farmers had significant relationship with their attitude towards Pangas farming. These findings clearly indicate that there was a positive ad significant trend between annual income of the Pangas farmers and their attitude towards Pangas farming. Faruque (2007), Burhan (2009) and Arefin (2011) also found similar results in their respective studies.

3.3.6. Credit received and attitude

The relationship between credit received of the Pangas farmers and their attitude towards Pangas farming was studied by testing the null hypothesis, i.e. "there is no relationship between credit availability of the Pangas farmers and their attitude towards Pangas farming".

The calculated value of r (-0.044^{NS}) was smaller than table value r (0.195) with 88 degrees of freedom at 0.05 level (Table 6). So, the null hypothesis could not be rejected and it was concluded that credit availability of Pangas farmers had no relationship with their attitude towards Pangas farming. This means that credit availability did not influence the Pangas farmers in forming attitude towards Pangas farming. Khan (2005) also found similar results in his respective study.

3.3.7. Training experience and attitude

The null hypothesis, i.e. "there is no relationship between training experience of the Pangas farmers and their attitude towards Pangas farming" was used to measure the relationship between training experience of the Pangas farmers and their attitude towards Pangas farming. The calculated value of r (0.338**) was greater than the table value r (0.270) with 88 degrees of freedom at 0.01 level (Table 6). Thus, the null hypothesis was rejected. It was therefore, suggested that training experience of the Pangas farmers had a positive and significant relationship with their attitude towards Pangas farming. This means that the farmers‟ attitude towards Pangas farming was influenced by training experience. Training experience helps the farmers to adopt improved practices and technologies in Pangas fanning. Rahman (2010) and Arefin (2011) also observed similar results in their respective studies.

3.3.8. Cosmopoliteness and attitude

The relationship between cosmopoliteness of the Pangas farmers and their attitude towards Pangas farming was studied by testing the concerned null hypothesis, i.e. "there is no relationship between cosmopoliteness of the Pangas farmers and their attitude towards Pangas farming". The calculated value of r (0.376**) was higher than the table value r (0.270) at 0.01 level (Table 6). So, the null hypothesis was rejected and it was concluded that cosmopoliteness of the Pangas farmers had relationship with their attitude towards Pangas farming. This means that cosmopoliteness influence the Pangas farmers in developing favorable attitude towards Pangas farming. These findings clearly indicate that there was a positive trend between cosmopoliteness of the Pangas farmers and their attitude towards Pangas farming. Haque (2002), Sadat (2002), Afrad (2002), Ali (2002), Haque (2003), Sarker (2001) and Jakir (2010) also found the similar findings in their respective studies.

3.4. Problems faced by the Farmers in Pangas Farming

Pangas farmers were faced different type of problem. The pangas farmers were asked to mention the extent of problems they faced in pangas farming. Pangas farmer‟s mentioned the frequency that at which extent they face these 12 selected problems, which are presented in Table 7.

Table 7. Rank order of the items related to problems faced by the Pangas farmers.

SL. No.	Problems	Respondents (N=90)				PFI	Rank order
		H (%)	M (%)	L (%)	N (%)		
1.	Lack of investment for Pangas farming	61	30	2	7	245	6
2.	Production cost high compared to low profit	54	36	6	4	240	7
3.	Pangas seeds are available in local market	56	30	11	4	239	8
4.	Unavailability of good quality fish feed	90	3	7	0	283	2
5.	Disease problem of Pangas	41	43	16	0	225	9
6.	Lack of training facilities about Pangas farming	72	22	2	4	262	5
7.	Lack of technology for the management practices of Pangas	29	60	9	2	216	10
8.	Low market price of Pangas	93	6	1	0	292	1
9.	Lack of quality Pangas seed	81	14	5	0	276	3
10.	Lack of marketing facilities	74	21	4	1	268	4
11.	Lack of security of fish farm	0	5	19	76	29	11
12.	Social or political pressure	0	0	2	98	2	12

H = High; M = Moderate; L= Low; N = Not at all and PFI = Problem Faced Index.

Pangas farmers faced different types of problem in culture period. Twelve problems are showing on Table 7, which is identified by the Pangas farmers, that problems are faced in culture period. “Low market price of Pangas” is the number one problem faced by the Pangas farmers. Government is not taking necessary steps to control the market price of Pangas. That‟s why the price of Pangas is decreasing day by day and this mentioned problem become more complex to the Pangas farmers. The second largest problem is unavailability of good quality fish feed. At present there are many feed company in Bangladesh but majority of them are not producing good quality fish feed. Third priority is unavailability of shop retailer. Now a days, lots of feed shop are available in upazila level markets or large markets but these shops are not available in small or village level markets. Because of that farmers‟ have to move to the large upazila level markets which is very much costly for the fish farmers. Haque (2010) also found similar problem. Third problem is “lack of quality Pangas seed”. Most of the hatchery owner is not maintained breeding law. So, good quality of seed is not produced in hatchery. Honest hatchery owner are needed to solve this problem. The last two ranked problem was “lack of security of fish farm” and “social or political pressure” which may be removed by the help of local administration and Nursery Owners‟ Association.

3.5. Overall problems faced by the Pangas farmers

In spite of greater potentiality of Pangas farming in Bangladesh, the farmers are not free from problems in Pangas farming. They usually face various problems on Pangas farming. Overall problems faced by the Pangas farmers ranged from 0 to 36 with a mean of 28.40 and standard deviation 7.54 (Table 8). On the basis of their score, the respondents were divided into three categories such as low, medium and high.

Table 8. Frequency distribution of farmers based on the problem they faced.

Extents of problems	Respondents		Mean	Std deviation
	Frequency	Percent		
Low (up to 12)	13	14.4		
Medium (13 to 25)	18	20.0	28.40	7.54
High (26 to 36)	59	65.6		

The data shows that about two-third percent of the respondents had high problem on Pangas farming compared to 20 percent and 14.4 percent of them having medium and low problem, respectively. This indicates that the desired level of Pangas farming will not be occurred if the different problems faced by the farmers are not mitigated by any means. Similar findings were found karmakar (2004). Faruque (2013) found majority of the farmers (91.43 percent) faced medium problem regarding Thai koi farming. Rahman (2011) observed that four-fifth of the respondents (83.64 percent) faced low problem in culturing small indigenous fish species.

4. Conclusions

The findings of the study revealed that the significant proportion (50.0 percent) of Pangas farmers had moderately favorable attitude towards Pangas farming. If new technologies and practices of Pangas farming are disseminated to the farmers, they can contribute to attain target of annual fish production especially in Pangas production. By increasing Pangas production, annual target of fish demand can be fulfilled. The situations like low market price of Pangas, inadequacy of quality Pangas seed's were very common as opined by the Pangas farmers in the study area. This leads to the conclusion that so long the farmers would continue to their farming in above situation, it will be difficult from them to get the desired output from Pangas farming. Most of the farmers (about 65.6 percent) in the study area faced high problem in Pangas farming and about 20 percent of the farmers had medium problem in Pangas farming. It may be concluded that without solving of these problems, higher fish production may be difficult in Muktagachha upazila under Mymensingh district. Correlation analyses showed that age, level of education, annual income, training experience about Pangus farming and cosmopoliteness of the respondents showed significant and positive relationship with the attitude of farmers towards Pangas farming. Therefore, it can be concluded that these characteristics of the farmers playimportant role on Pangus farming. Family size, farm size and credit received of the farmers no significant relationship with their attitude towards Pangas farming; these variables seem to have no major influence in forming attitude of the farmers.

Conflict of interest

None to declare.

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