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Constraints experienced by the hatchery operators in the production of fish fry

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ABSTRACT

The main purpose of the study was to determine the constraints experienced by the hatchery operators in the production of fish fry and to explore the relationships between eight selected characteristics of the hatchery operators and their constraints in the production of fish fry. Field work for the study was conducted in sadar Upazila under Mymensingh district. Data were collected from 70 selected hatchery operators from the study area. A structured personal interview schedule was used for collecting data during April to May 2014. Coefficient of correlation(r) was used to explore the relationships between the concerned variables. The study demonstrated five aspects of constraints: namely- rearing broodfish, breeding, rearing of fish fry, transportation of fish fry, capital constraints; were considered for measuring hatchery operators' constraints in the production of fish fry. The selected characteristics of the hatchery operators were: age, educational qualification, household size, area under hatchery operation, knowledge on hatchery management, annual income, extension media contact and organizational participation. The observed constraints score of the hatchery operators ranged from 15 to 52 against the possible range of 0 to 60. The average constraints score was 32.32. Majority (72.86) of the hatchery operators were found to face medium constraints, while 12.86 percent faced low constraints and 14.28 percent faced high constraints in the production of fish fry. Constraints Facing Index (CFI) for all the 20 constraints items ranged from 8 to 176. Among the total 20 constraints under five aspects "lack of capital (CFI=176)" had the highest CFI and "unavailability of proper transport (CFI=8)" had the lowest. Among the eight characteristics of the hatchery operators, area under hatchery operation, knowledge on hatchery management, annual income and extension media contact showed significantly negative relationship with constraints. On the other hand, age, educational qualification, household size and organizational participation of the respondents did not show any significant relationship with their constraints.

Introduction

Fish fry being the major input for fish farming. Traditionally, in the Bangladesh fish fry was collected from rivers such as the Padma, the Jamuna, the Halda and their tributaries during the monsoon period. A large amount of fish fry were collected from these rivers. Aquaculture in that time totally depends upon the natural fish fry. Until the year 1978, the country was completely dependent on fry produced in rivers. Many people were engaged with fry collection from rivers. They collected fish fry from commercially or non-commercially. Then they sold to the fish farmer. Collection of fish fry from rivers was the main income generating activities of the many family. But with the course of time, the production of fish fry in the rivers has been reduced due to many reasons such as destruction of many breeding grounds caused mainly by siltation, lack of broods as they are caught by extreme fishing pressure, water pollution, unplanned fry collection etc. For these reasons, the production of fry in rivers becomes critically low. To produce fish fry for aquaculture artificial fish breeding techniques and low cost hatchery designs have been successfully adapted to Bangladeshi conditions since 1975.

Day by day many private hatcheries established in our country (Hasan and Ahmed, 2002). So most of the hatchery owners did not follow hatchery code of contract, breeding protocols, brood stock and hatchery management technology. They can use same age (brother and sister) male and female brood for induced breeding in their hatcheries. As a result, several problems such as inbreeding, growth stagnated, production of small fish and finally reduced aquaculture production could occur.

To operate hatcheries skilled, experienced, educated manpower (hatchery operator) is the pre-requisite conditions. We called these manpower is hatchery operator. To operate the hatchery, the hatchery operators face some constraints. These constraints are related to negative selection of broodstock, indiscriminate hybridization, inbreeding, water quality. But the problem and how they are specifically related fry quality and fry performances have not been rigorously and comprehensively investigated. For these reasons, hatchery owners, nursery operators, fry traders, and stakeholders face economic loss to some extent. However scientific study on this problem is still lacking. Considering the contribution of hatcheries located in deferent places of the country on our national

aquaculture, it can be stated that extensive research work should be carried out to make fry producing and marketing business sustainable.

Fish fry trading is profitable (Sultan 2008), concerns have arisen about the long term sustainability, lack of sufficient fund, high price of input, lack of marketing facilities, lack of scientific and technical knowledge, lack of quality broodfish, indiscriminate hybridization, inbreeding, water shortage in dry season etc. The study suggests some possible steps to remove these constraints. In view of the above background and facts, the present study aimed to determine the extent of constraints as experienced by the hatchery operators in the production of fish fry. And to explore the relationship between the selected characteristics of the hatchery operators and their constraints in the production of fish fry.

Materials and methods

Study population and sample

The study was carried out in some selected unions of Mymensingh sadar upazila under Mymensingh district. The selected unions were: Boyra, Akua, Khagdahar, Shambhuganj, Paranganj, Chor Nilakshmia. All the hatchery operators of these unions were the population of the study. In the study area, some hatchery operators earn their livelihood from hatchery. Hatchery operators were not a good number in the study area. Because one hatchery keep one or two hatchery operators for operating the hatchery. For this reason all the population of the study area was sample of the study. Samples were selected by Whole population Sample Technique. In this way 70 samples were selected for investigating their constraints that experienced in the production of fish fry.

Measurement of variables

In the present study, the respondents' selected characteristics viz. age, educational qualification, household size, area under hatchery operation, knowledge on hatchery management, annual income, extension media contact and organizational participation were considered as explanatory variables. Extent of the constraints experienced by the hatchery operators in the production of fish fry constituted the focus variable.

Age

Age of a respondent was measured in terms of actual years from his birth to the time of interview. A score of one (1) was assigned for each year of age. It was measured in complete years as reported by a respondent.

Educational qualification

Education of a respondent was measured in terms of years of schooling completed by an individual in educational institute. If a respondent did not know how to read and write his literacy was taken as zero (0). A score of 0.5 was given to that respondent who could sign his name, only. Besides, a respondent got actual score of one for every year of schooling i.e. 1 for class one, 2 for class two and so on.

Household size

Household size was operationalized by computing the total number of members of a respondent's family, who jointly lived and ate together. A score of 1 was assigned to each member of the family and 2 for two members and the actual number given by the respondents made the scoring.

Area under hatchery operation

Area under hatchery operation of a respondent was measured in hectares using the following formula:

$$AUHO = A_1 + A_2 + A_3$$

Where,

AUHO= Area under hatchery operation

A_1 = Own lands

A_2 = Land taken from others on share

A_3 = Land taken from others on lease

The data were first recorded in term of local unit and then converted to hectare.

Knowledge on hatchery management

For measuring hatchery management knowledge of a respondent, the researcher followed the Bloom's Taxonomy of Cognitive Domain which was modified and revised by Anderson and Krathwohla (2000).In this case knowledge was measured by asking 10 questions. Considering the level of difficulty, different scores were assigned for the correct responses for different questions Thus, knowledge on hatchery management of the respondents could range from 0 to 28, where, 0 indicated no knowledge and 28 indicated high knowledge on hatchery management.

Annual income

All the earnings of a respondent's family from agricultural income and occupational income were added to determine his gross annual income. The income was measured in taka by multiplying the quantity of those crops with its prevailing market price per unit quantity. In case of business or service, their monthly income was multiplied by twelve to determine annual income. However, unit score of one (1) was taken for every Tk. 1000/- of annual income.

Extension media contact

Extension media contact may be defined as one's extent of exposure to different extension teaching methods. Extension Media contact was computed by counting the assigned scores for each respondent on the basis of her contact with three pre-selected extension media noted in the interview schedule. The frequency of contact with an

information source was classified into four categories as "frequently" occasionally", "rarely" and "not at all" and a weight of 3, 2, 1 and 0 assigned to these categories respectively.

Organizational participation

Organizational participation of a respondent was measured on the basis of status of his participation and duration of participation in different organizations. Participation status score was computed as 0 for no participation, 1 for Participation as ordinary member and 2 for Participation as executive committee member.

Measurement of focus variable

The researcher classified the constraints experienced by the hatchery operators in three different aspects viz. rearing brood fish, breeding, rearing of fish fry, transportation of fish fry, capital constraints. Researcher measured the dependent variable was measured in three point of view i.e. measurement of overall constraints score, measurement of five different aspects of constraints and comparative measurement of individual constraints items.

Measurement of overall constraints score

Each farmer was asked to indicate the extent of difficulty caused by each of the constraints by checking any of the four responses such as "high", "medium", "low" and "not at all" and weights were assigned to these response as 3, 2, 1 and 0 respectively. Thus the possible range of constraints facing score for each constraint could be 0 to 3 and possible range of overall constraints facing for score for 20 constrains could range from 0 to 60. In this case, 0 indicated no constraint and 60 indicated very high constraint.

Comparison among the constraints

A Constraint Facing Index (CFI) for each 20 selected constraints was computed by using the following formula:

$CFI = (C_h x3) + (C_m x2) + (C_l xl) + (C_o xO)$

Where,

C_h =Number of responses indicating high constraint

C_m =Number of responses indicating medium constraint

C_l =Number of responses indicating low constraint

C_n =Number of responses indicating no constraint

Constraint Facing Index (CFI) for any one of the selected constraint could range from 0 to 210, where, 0 indicated no constraint facing and 210 indicated highest constraint facing.

Data collection

A structured interview schedule was used as data gathering instrument keeping the objectives of the study in mind. Before development of 20 items for constraints, a number of contacts were held with UFO (Upazila Fisheries Officer) of Mymensingh sadar upazila. Two group discussions were held with the hatchery operators of sadar upazila, where the constraint items were identified.

The researcher himself collected data from the sampled hatchery operators by using the personal interview schedule during the month of April and May, 2014. Before starting collection of data, the researcher met the respective District Fisheries Officer (DFO), Upazila Fisheries Officer (UFO) and Fisheries Extension Officer (FEO). The researcher also discussed the objectives of the present study with the respondents so that they did not hesitate to answer at the time of interview. However, if any respondent failed to understand any of the questions, the researcher took necessary care to explain the issue as far as possible. Descriptive analysis such as mean, range, number and percentage, standard deviation and rank order were used whenever necessary. Pearson's Product Moment Correlation Coefficient (r) was computed to explore the relationships between the focus variable and the selected characteristics of hatchery operators.

Results and discussion

Characteristics of the hatchery operators

Age

The age of the respondent hatchery operators ranged from 19 to 58 years with an average of 39.89 years and standard deviation of 13.41. On the basis of their age, the respondents were classified into three categories, namely young (up to 30), middle aged (31-50) and old (above 50) as shown in Table 4.1. The data indicate that the highest proportion (72.86 percent) of the respondents were middle aged compared to being 22.86 percent young and 4.28 percent old. Thus, 95.72 percent of the farmers were either young or middle aged. Young and middle aged people are generally more receptive to new ideas and practices and expected to face less constraint in adoption and practice of technology.

Educational qualification

The education score of the hatchery operators ranged from 0 to 14, with an average of 5.17 and standard deviation 5.07. Based on their education scare, hatchery operators were classified into five categories, namely, illiterate (0), can only signature (0.5), primary education (1-5), secondary education (6-10), above secondary (> 10) as shown in Table 1. It is evident from the table that 8.56 percent of the respondents were illiterate, 12.86 percent of the respondents can only signature, while 14.29, 50 and 50 percent had primary education, secondary education and 14.29 percent had above secondary education, respectively. Majority (50 percent) of the hatchery operators in the study area had secondary level of education.

Table 1. Salient feature of hatchery operators who operate the hatchery.

Characteristics	Scoring system	Range	Category	Number (N=70)	Percent	Mean	SD
Age	Years	19-58	Young (up to30)	16	22.86	39.89	13.41
			Middle aged (31 to 50)	51	72.86		
			Old(>50)	3	4.28		
Educational qualification	Level of schooling	0-14	Illiterate(0)	6	8.56	5.17	5.07
			Signature only (0.5)	9	12.86		
			Primary Level (1-5)	10	14.29		
			Secondary Level(6-10)	35	50		
			Above secondary (above 11)	10	14.29		
Household size	Numbers	2-13	Small (up to 4)	9	12.86	5.91	2.70
			Medium (5-6)	23	32.86		
			Large (>6)	38	54.28		
Area under Hatchery operation	Hectare	0.12-12.96	Very small (up to 0.5ha)	16	22.86	2.12	2.57
			Small (0.51-1.0 ha)	23	32.86		
			Medium (1.1-3 ha)	24	34.28		
			Large (>3ha)	7	10		
Knowledge on Hatchery Management	Score	03-26	Low (0-9)	11	15.71	14.20	8.35
			Medium (10-18)	48	68.58		
			High (>18)	11	15.71		
Annual income	Taka (in '000')	820-15360	Low (up to 1500)	8	11.43	3233.30	1931.93
			Medium (1501-4000)	30	42.86		
			High (>4000)	32	45.71		
Extension media contact	Score	2-32	Very low (up to 6)	8	11.43	14.92	10.41
			Low (6-12)	26	37.14		
			Medium (13-24)	29	41.43		
			High (>24)	7	10		
Organizational participation	Score	0-34	No (0)	20	28.57	12.32	12.04
			Low (1-10)	23	32.86		
			Medium (11-25)	22	31.43		
			High(>25)	5	7.14		

Household size

The household size of the respondents under this study ranged from 2 to 13, with an average of 5.91 and standard deviation 2.70. On the basis of their household size, the hatchery operators were classified into three categories, such as `small family' (up to 4), `medium family' (5-6) and `large family' (above 6). Table 4.1 indicates that majority (32.86 percent) of the respondents fell into medium household size category followed by 12.86 percent of small household size and 54.28 percent with large household. In the study area it was observed that, hatchery operators with medium to large household size generally engage in various types of activities.

Area under hatchery operation

Area under hatchery operators of the respondents ranged from 0.l2 to 12.96 hectares with a mean of 2.12 and standard deviation of 2.57. The hatchery operators were classified into four categories which has been shown in table 4.1. Data presented in the table indicate that 22.86 percent had very small hatchery area, 32.86 percent had small hatchery area, 34.28 percent had medium hatchery area and 10 percent had large hatchery area. So, majority of the hatchery had small to medium area.

Knowledge on hatchery management

Knowledge on hatchery score of the hatchery operators ranged from 3 to 26 against the possible range from 0 to 28. The average score was 14.20 and standard deviation was 8.35. Based on hatchery knowledge score, the hatchery operators were classified into three categories as were shown in Table 1. More than half of the respondents (68.58 percent) had medium knowledge on hatchery, while 15.71 percent had low and 15.71 percent had high knowledge on hatchery. The hatchery operators of the study area received training on hatchery technologies from the Upazila Fisheries Office, BFRI, government and private hatcheries and local NGOs. They practically learned how to breed the fish in the hatchery. They engage with hatchery during the whole breeding season. We can say that a hatchery operator has medium knowledge on hatchery.

Annual income

The annual income of the hatchery operators ranged from 820 to 15360 thousand, the average being 3233.30 thousand and standard deviation 1931.93. On the basis of annual income the hatchery operators were classified into three categories, such as ` low income' (upto 1500 thousand Tk.), `medium income' (1501-4000 thousand Tk.), `high income' (above 4000 thousand Tk.). The categories and distribution of the respondents according to their annual income have been presented in Table 1. The data showed that 11.43 percent of the hatchery operators had low annual income, 42.86 percent had medium annual income, 45.71 percent had high annual income and. The vast majority (88.57 percent) of the respondents had medium to high annual income. The sources of income of respondents were farming, selling of fish fry, agricultural products, fishing, poultry, trees, service, business and other sources. The finding gives the indication that as the respondent's annual income was fairly good, they faced less constraint in producing fish fry.

Extension media contact

The extension media contact score of the respondents varied from 2 to 32 against a possible score ranged from 0 to 36. The mean 14.92 and standard deviation was 10.41. On the basis of the extension media contact score the respondents were classified into four categories as shown in Table 1. Majority of the respondents (37.14 and 41.43 percent) had low and medium extension media contact respectively; while 11.43 percent had very low and 10 percent had high media contact .Hatchery operators had medium contact with extension agent. They contact with extension agent very often for getting tips about hatchery science. They had also taken training from different extension organization.

Organizational participation

The computed organizational participation score of the respondents ranged from 0 to 34 with an average of 12.32 and standard deviation being 12.04. On the basis of organizational participation score, the respondents were classified into four categories as shown in Table 1. Data in the table indicate that 28.57 percent of the respondents had no participation in any organization, 32.86 percent of them had low participation, 31.43 percent had medium and 7.14 percent had high organizational participation. The hatchery operators with more organizational participation scores are expected to use more communication media in receiving information on fish fry production.

Overall constraints in the production of fish fry

The respondents' constraints facing scores in all 20 selected constraints could range from 0 to 60, where 0 indicating no constraints and 60 indicating high constraints. However, the observed constraints scores ranged from 15 to 52 with an average of 32.32 and standard deviation of 14.13. Based on their overall constraints scores, the respondents were classified into three categories as presented in Table 2.

Table 2. Categorization of respondents according to their overall constraints experiencing in producing fish fry.

Category	Respondents		Mean	Standard Deviation
	No	Percentage		
Low (up to 20)	9	12.86	32.32	14.13
Medium (21-40)	51	72.86		
High (41-60)	10	14.28		
Total	70	100		

Data in table 2 indicate that majority (72.86 percent) of the respondents had medium constraints while 12.86 percent had low constraint and 14.28 percent had high constraint in the production. The mean value (32.32) clearly indicates that the hatchery operators in average faced medium constraints in the production of fish fry.

Constraints in different aspects of hatchery

For having a clear understanding of the constraints faced by the hatchery operators, the present study analyzed the constraint is five aspects, namely rearing brood fish, breeding, rearing of fish fry, transportation of fish fry and capital constraints. A summary of findings on this regard have been presented in Table 3.

Table 3. Categorization of respondents based on their constraints in different aspects.

Aspects of constraints	Categories	Respondents		Observed and possible range	Mean	Standard Deviation
		No.	%			
Rearing brood fish	Low (0-4)	18	25.71	(0-11)		
	Medium (5-8)	49	70			
	High (above 8)	3	4.29	(0-12)	6.08	3.76
Breeding	Low (0-4)	15	21.43			
	Medium (5-8)	49	70	(0-11)	6.16	.13
	High (above 8)	6	8.57	(0-12)		
Rearing of fish fry	Low (0-4)	17	24.29			
	Medium (5-8)	53	75.71	(0-8)	2.60	2.74
	High (above 8)	0	0	(0-12)		
Transportation of fish fry	Low (0-4)	21	30			
	Medium (5-8)	49	70	(0-7)	2.69	2.86
	High (above 8)	0	0	(0-12)		
Capital constraints	Low (0-4)	14	20			
	Medium (5-8)	19	27.14	(0-12)	6.43	4.24
	High (above 8)	37	52.86	(0-12)		

Table 4. Rank order of 20 selected constraints as experienced by hatchery operators in the production of fish fry.

Name of the constraints	High (3)	Medium (2)	Low (1)	Not at all (0)	CFI	Rank order
Lack of capital	42	22	6	0	176	1
Lack of skill manpower	35	29	1	5	164	2
Lack of land	38	21	7	4	163	3
Inbreeding	32	21	7	10	145	4
Mortality of fry	27	25	10	8	141	5
High interest of credit	24	28	6	12	134	6
Diseases	11	29	23	7	114	7
Nutritional feed supply	12	22	30	6	110	8.5
Lack of infrastructure	34	2	4	30	110	8.5
Fluctuation of temperature	18	8	32	12	102	9
Managing water quality	5	19	35	11	88	10
Lack of oxygen facilities	12	15	20	23	86	11
Catching & handling	1	33	14	22	83	12
Over doses of hormones	6	5	33	26	61	13
Outbreak of diseases	0	0	58	12	58	14
Unavailability of hormones	0	4	31	35	39	15
Water quality	0	0	28	42	28	16
Packaging of fish fry	0	0	22	48	22	17
Lack of appropriate feed for fry	0	0	17	53	17	18
Unavailability of proper transport	0	0	8	62	8	19

CFI: Constraints Facing Index (possible score range 0 to 210)

Comparison among the individual constraints

For having the better understanding regarding hatchery operators constraints in the production of fish fry, it was necessary to have an idea about the comparative constraint facing in 20 selected constraints. For this purpose, a Constraint Facing Index (CFI) was computed. The computed CFI of the 20 constraints ranged from 8 to 176 (against a possible range from Q to 210) which are arranged in rank order according to their CFI as shown in Table 4.

Data in Table 4 indicate that lack of capital was major constraints for operating hatchery. For operating hatchery need cash money, which most of the Bangladeshi hatchery owners do not generally possess. Majority of the people are not financially stable in the study area. In the study area out of 70 hatchery operators 10 hatchery operators faced these constraints at high extent, 51 hatchery operators faced at medium extent and 09 hatchery operators faced at low extent (Table 4).

Most of the hatchery operators complained that non-availability of skill labor, lack of quality brood fish, lack of quality hormones were problem in operating the hatchery. Many hatchery operators complained that high prices of nutritional food, oilcake, hormones, breeding materials etc. was great problem in the way of expanding the fish fry production. Table 4 revealed that 64 hatchery operators (12+22+30) out of 70 hatchery operators reported that they had to purchase these inputs from the local traders who charged higher price than the normal market price.

Most of the hatchery operators were not higher educated. For this, they cannot print materials for gathering necessary knowledge related to improve quality fish fry. Findings showed that 21.43 percent hatchery operators were fully illiterate and 50 percent hatchery operator's secondary level education in the study area. Therefore, it was difficult for them to gain knowledge directly from mass media. So that lack of modern technical knowledge on improved fish fry production was also a major constraint in hatchery operation.

Relationship between the selected characteristics of the hatchery operators and their constraints

Result in table 5 revealed that area under hatchery operation, knowledge on hatchery management, annual income, and extension media contact were negatively correlated with the hatchery operators' constraints in the production of fish fry. The characteristics age, educational qualification, household size and organizational participation of the respondents did not show any positive relationship with their constraints in the production of fish fry.

Table 5. Relation between the selected characteristics of the hatchery operators and their constraints in the production of fish fry (N=70), degree of freedom 68.

Focus Variable	Selected characteristics of the hatchery operators	'r' values (with d.f. =68)
Constraints Experienced By the Hatchery operators in The Production of Fish Fry	Age	-0.101
	Educational qualification	-0.011
	Household size	-0.108
	Area under hatchery operation	-0.311**
	Knowledge on hatchery management	-0.935**
	Annual Income	-0.481**
	Extension media contact	-0.783**
	Organizational participation	0.053

** Correlation is significant at 0.01 level of probability (2 tailed test)

Relationship between age and constraints in the production of fish fry

There is a non significant negative relationship (r =--0.101) between age of the hatchery operators and their constraints in producing fish fry. Thus the null hypothesis was accepted which implied that there was no direct relationship between the age of the hatchery operators and their constraints in producing fish fry. Akanda (1993) found that there was no relationship between age of the farmers and their problem confrontation in using quality rice (BR 11) seed. Similar findings were obtained by Karim (1996), Halim (2003), Nahid (2005) and Hasan (2005) in the study.

Relationship between educational qualification and constraints in the production of fish fry

There is no relationship (r =-0.011) between educational qualification of the respondents and their constraints in the production of fish fry. Halim (2003) in his study on the constraints faced by the farmers in adopting crop diversification found that there is no relationship between education and heir problem confrontation. Karmakar (2004) in his study found a negatively significant relationship between education of the farmers and their constraints hi adopting aquaculture techniques. Similar findings were obtained by Bhuyian (2002), Karim (1996) and Rahman (1995) their respective studies.

Relationship between household size and constrains in the production of fish fry

The respondents had no relationship (r =-0.108) with their constraint in the production of fish fry. Haque (1995) found that there was no significant relationship between family size and problem confrontation of the Mohila Bittaheen Samabaya Samittee. Similar findings were obtained by Bhuyan (2002) and Halim (2003) in their respective studies.

Relationship between area under hatchery operation and constrains in the production of fish fry

There is a significant negative relationship (r = -0.311) between area under hatchery operation of the hatchery operators and their constraints in the production of fish fry. The findings indicate that larger the area under hatchery operation less the constraints in the production of fish fry. Karmaker (2004) in his study found no significant relationship between pond area of the farmers and their constraints in adopting aquaculture techniques. Similar findings were obtained by Bhuyan (2002) in the study.

Relationship between knowledge on hatchery management and constrains in the production of fish fry

There is negatively significant relationship (r =-0.935) between knowledge on hatchery operators and their constraints in the production of fish fry was. Rahman (1995) reported that the knowledge on aquaculture had no significant relationship with their constraints in cotton cultivation faced by the farmers. Similar finding was obtained by Salam (2003). Bhuyian (2002) in his study found significant negatively relationship between knowledge of the farmers in banana cultivation and their faced constraints hi banana cultivation. Similar findings was obtained by Karmaker (2004) in the study.

Relationship between annual income and constrains in the production of fish fry

It is observed that annual income of the respondents had negatively significant relationship (r =-0.481) their constraints in producing fish fry are. The findings indicated that higher the annual income of hatchery operators the lower was their faced constraints. Bhuyan (2002) in his study found no significant relationship between annual income of the farmers and their constraints hi banana cultivation. Similar findings was obtained by Halim (2003).
Karmaker (2004) in his study found negatively significant relationship between annual income of the farmers and then" constraints in adopting aquaculture techniques. Similar findings were obtained by Rahman (1995) and Nahid (2005) in the study.

Relationship between extension media contact and constraints in the production of fish fry

The data showed that extension media contact of the hatchery operators has a significant negative effect (r =-0.783) on their faced constraints. The findings indicated that higher the extension media contact of the hatchery operators the lower was their faced constraints. Haque (1995) found in this study that extension contact of the members of Mohila Bittaheen Samabaya Samittee had no significant relationship on their problem confrontation. Rahman (1995) in this study concluded that extension contact of the farmers had significant negative relationship with their faced constraints in cotton cultivation

Relationship between organizational participation and constrains in the production of fry

There is a no significant positive relationship (r =0.053) between organizational participation and constraints in producing fish fry. The relationship between the concerned variables was non significant. Based on the above finding, the researcher concluded that organizational participation of the hatchery operators had no significant relationship with their constraints.

Conclusions

In the selected study area, hatchery operators face relatively medium problem than other areas of Bangladesh. Even hatchery operators faced medium constraint in the study area and it might be considered as a case for further investigation. The hatchery operators were found to face relatively higher constraints in lack of capital, skill manpower and land, inbreeding, mortality of fry. Area under hatchery operation had negatively significant relationship with constraints in the production of fish fry. Thus investigator concluded that, larger the hatchery area lower the constraints in the production of fish fry. If appropriate steps are taken to increase hatchery operator's technological knowledge in hatchery operation, they will be involved in this income generation activity. More annual income can increase financial stability of the hatchery operators that they can earn from hatchery. Finally the increase of extension media contact of hatchery operators would increase their knowledge and skill, and ultimately decrease constraints in the production of fish fry.

Recommendations

On the basis of the findings and conclusion of the study, the following recommendations for policy implication are made:

- As majority of the hatchery operators were found to face medium constraints in the production of fish fry, The Ministry of Fisheries concerned departments should carefully observed the socioeconomic situation of the hatchery of the study area and come up with appropriate programmes that the hatchery operators can maximize their profit in hatchery.
- The DoF and other organization involved in fry production promote programme in Mymensingh areas should try to remove the specific constraints as faced by the hatchery operators.
- The DoF and other NGOs should strengthen their extension services to the hatchery operators to overcome their constraints. Extension services should provide adequate motivational programme for fish fry production, increase hatchery operators knowledge and extension media contact.
- Proper guidance and necessary help should be given to the hatchery operators so that they can

overcome their constraints of the financial inability. The concerned authorities should increase the availability of credit from any commercial bank or NGO with low interest.

- The government should take some measures for ensuring easy availability of inputs at reasonable prices.
- Meeting at result demonstration and group discussion method should be strengthened in disseminating innovative information, as these more less constraint among the hatchery operators through practical observation.
- It reveals that the hatchery operators with better organizational participation having opportunity to expose themselves with various information in hatchery operation. Therefore, group approach of extension could effectively be used by different extension agencies in disseminating farm information.

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