Adoption of scientific fish farming practices in West Tripura district of Tripura, India

K. BORAH[1], Y.J. SINGH[1], A. SARKAR[1], S.K. SINGH[2], P. PAL[1], O.N. KHUMAN[1] and C. PEGU[1]

[1]Department of Extension & Social Sciences, College of Fisheries, CAU (I), [2]Department of Aquaculture, College of Fisheries, CAU (I), College of Fisheries, Central Agricultural University (Imphal), Lembucherra, Tripura-799 210

ABSTRACT : The study was designed to investigate the adoption level of scientific fish farming practices by the fish farmers. The study was carried out in West Tripura district of Tripura. Random sampling technique was applied for the selection of respondent fish farmers. Quantitative data were collected from 80 respondents using prestructured interview schedule during a period from October to December, 2017. Results of the study reveals that majority of farmers were found to practice traditional farming without much scientific knowledge like "Initial soil and water testing", "Acclimatization of fish seeds before stocking", "Stocking appropriate number of fish seeds", "Application of commercially available supplementary feeds" etc. However, periodical application of cow dung or any other organic manure was found to be fully adopted by more than half of the respondents (55%). Moreover from the results, significant positive correlation was found between annual income, extension contact, information source exposure, economic motivation, information management behaviour, training exposure and experience in fisheries with the adoption level of scientific fish farming practices of the fish farmers of study area.

Key words: Adoption, scientific fish farming, fish Farmer, West Tripura.

Fishes are irreplaceable in the daily diets of people of Tripura wherein more than 95 per cent of populations are fish eaters. The area under capture fisheries constitutes about 23.72% while the remaining 76.28% comes under culture fisheries (Anonymous, 2014). West Tripura district of the state has the highest fish farming population, which is about 38.06 % of the total fish farmers in the state. Private fish farmers contributed highest to total fish production from culture fisheries (Debnath *et al.*, 2013). The preference for fish and its associated products in the state is so high that its present per capita fish consumption stands high at 17.62 kg against a target of 20 kg and thus, the point of assumption towards self sufficiency is still not yet made fully. In terms of water resources, the state has a total water area of 33,217.46 ha (3.20% of total area) which is suitable for fish cultivation. With this strength and some technological breakthrough, it can further increase its production of 65,164 MT (Year 2014) which is only 81% of the total requirement. At present, the state fulfill its deficit requirement from Andhra Pradesh, West Bengal and even Bangladesh, to the tune of 14,997 MT (MANAGE -National Institute of Agricultural Extension Management, 2017).

Owing to the topographical feature that the state has ranging from hilly topography as well as wide coverage of forest area, scope for horizontal expansion in aquaculture is limited. In achieving the envisaged target, the gap between demand and supply of fish needs to be narrowed down that promises self-sufficiency in the state. Due importance has to be given towards exploring the components of vertical expansion in fish production. Several reports emphasize the need for assessing the technological advances and adoption level in many pockets of the state. The idea behind the adoption of scientific fish culture or improved practices for fish production is to secure maximum biomass of fish per unit area through a scientifically managed water body either by selecting a fast growing, economically important, compatible species having shortest food chain or utilizing the all ecological niches of the water body. The adoption of new technology is described as innovation decision process through which an individual passes through the time of first knowledge of the innovation and lastly to a decision stage of either adoption or rejection that finally leads to a concrete decision (Ekong, 2002).

However, majority of the respondent in the study area practice fish culture as secondary occupation without much application of any scientific farming practices that results into poor yield. It is assumed that the low

productions could be increased through proper management aspects as per requirements of the fish farmers. In preview of this disadvantageous situation faced by the farmers, the present study was carried out to access the adoption level of scientific fish farming practices among the fish farmers of West Tripura with major emphasis on quantifying the extent of adoption level of scientific fish farming practices, understanding the relationship among socio-personal characteristics of fish farmers and their adoption level; and to identify the problems in adoption of scientific fish farming practices.

MATERIALS AND METHODS

The study was carried out during 2017-18 at West Tripura district of Tripura. To find out the required number of respondent fish farmers (80 farmers), four blocks were selected from the district based on the prevalence of fish farmers. The blocks were: Mohanpur, Mandai, Jirania and Lephunga. Two villages were purposively selected from each of the above mentioned blocks. The selected villages were: Kalkalia and Bidyasagar from Mohanpur block; Rajghat and Uttar Bodhjung Nagar from Lephunga block; Durganagar and Uttar Majlishpur from Jirania block; West Dinabandhunagar and Laximipur from Mondai block.

The adoption level of each respondent was calculated using the formula developed by Kumaran *et al,* (2003).

$$\text{Adoption} = 100 \times \frac{n}{N}$$

n = No. of respondents who had adopted the practice
N = Total number of respondents

Socio-economic and socio personal characteristics viz., age, educational status, family status, occupational status, annual income, achievement motivation, economic motivation, social participation status, experience in fisheries, extension contact, cosmopoliteness, training exposure, information management behaviour *etc*. were selected for the study along with that variables like information source exposure and credibility of information source were also selected for study. The data were randomly collected from 80 respondents through face to face personal interview with the help of pre-tested survey schedule. Data were analyzed using statistical methods like percentage analysis, mean, standard deviation and correlation coefficient using SPSS 16.0 (Statistical Package for Social Sciences).

Frequency and percentage

While the frequency (or absolute frequency) of an event is the number of times the event occurred in an experiment or study, percentage is a fraction expressed with 100 as its denominator. It was used to any set of data for comparison.

Ranking

Ranking, as an expression of respondents' assigned priority about their feeling against a set of structured questions/statements, was utilized in the present study for classifying the responses in order of perceived importance and also for preparing an order of the observed data emanated from the study.

Spearman's rank correlation

The rank correlation coefficient is the measure of correlation that exists between the two sets of ranks. In other words, it is a measure of association that is based on the ranks of the observations and not on the numerical values of the data. For calculating rank correlation coefficient, first of all the actual observation needs be replaced by their ranks, giving rank 1 to the highest value, rank 2 to the next highest value and following this very order ranks are assigned for all values. If 2 or more values happen to equal, then the average of the ranks which should have been assigned to such values had they been all different, is taken and the same rank (equal to the said average) is given to concerning values. The second step is to record the difference between ranks (or 'd') for each pair of observations, then square these difference to obtain a total of such differences which can symbolically be stated as Σdi^2.

$$\text{Spearman's 'r'} = 1 - \left\{ \frac{6\Sigma\, dt^2}{n(n^2-1)} \right\}$$

Where,
n = Number of paired observation;
d = difference between corresponding ranks.

The value of spearman's rank correlation coefficient will always vary range +-1, +1, indicating a perfect positive correlation and -1 indicating perfect negative correlation between two variables.

In case the sample consists of more than 30 items, then the sampling distribution of 'r' is approximately normal

with a mean of zero and a standard deviation of $\frac{1}{\sqrt{n-1}}$ and thus, the standard error of r is:

$$\sigma_r = \frac{1}{\sqrt{n-1}}$$

Stepwise Regression analysis

To determine the influence of the independent variables on adoption of scientific fish farming practices of the fish farmers, step wise regression was applied and results are presented in Table 3.

RESULTS AND DISCUSSION

Adoption levels of scientific fish farming by the fish farmers of West Tripura are presented in Table 1. It could be seen that the fish farmers had not adopted several scientific fish farming practices such as stocking appropriate number of fish seeds (68.75%), acclimatization of fish seeds before stocking (67.50%), initial soil and water testing (62.50%) and application of commercially available supplementary feeds (60.00%). The practices such as control of aquatic weed fish (46.25%), practice of mixed farming with other compatible fish species (37.50%) and control of aquatic insects and weeds (27.50%) were partially adopted by the fish farmers of the study area. Application of inorganic fertilizers (62.50%) was least adopted among the respondents in the study area. More than half of the respondents adopted periodical application of cow dung or any other organic manure (55.00%) apart from that practice like mixed farming with other compatible fish species (40.00%) and use of lime during pond preparation (36.25%) were also found to be fully adopted by the respondents.

It is apparent from Table 2 that age, education, family status; social participation, achievement motivation and cosmopoliteness are insignificant with the information management behaviour of the respondents. Whereas annual income, extension contact, experience in fisheries, economic motivation, information source exposure, credibility of information source, training exposure and information management behaviour were

Table 1: Adoption of scientific fish farming practices by the fish farmers

SN	Scientific fish farming practices	Adoption level			
		NA	PA	LA	FA
1.	Initial soil and water testing	50(62.50%)	11(13.75%)	2 (2.50%)	17(21.25%)
2.	Control of aquatic weed fish	23(28.75%)	37(46.25%)	5(6.25%)	15(18.75%)
3.	Control of aquatic insects and weeds	20(25.00%)	22(27.50%)	22(27.50%)	16(20.00%)
4.	Use of lime during pond preparation	9(11.25%)	22(27.50%)	20(25.00%)	29(36.25%)
5.	Periodical application of cow dung or any other organic manure	8(10.00%)	22(27.50%)	6(7.50%)	44(55.00%)
6.	Application of inorganic fertilizers	17(21.25%)	4(5.00%)	50(62.50%)	9 (11.25%)
7.	Acclimatization of fish seeds before stocking	54(67.50%)	14(17.50%)	10(12.50%)	2 (2.50%)
8.	Practice of mixed farming with other compatible fish species	10(12.50%)	30(37.50%)	8(10.00%)	32(40.00%)
9.	Stocking appropriate number of fish seeds	55(68.75%)	11(13.75%)	9(11.25%)	5 (6.25%)
10.	Application of commercially available supplementary feeds	48(60.00%)	11(13.75%)	13(16.25%)	8(10.00%)

(NA: Not adopted, PA: Partially adopted, LA: Least adopted, FA: Fully adopted.

Table 2: Correlation of the independent variables with the adoption of scientific fish farming of fish farmers

SN	Independent variables	'r' value	Dependent variable
1.	Age	0.112 (NS)	Adoption of scientific fish farming
2.	Education	0.199 (NS)	
3.	Family status	0.072 (NS)	
4.	Achievement motivation	0.176 (NS)	
5.	Economic motivation	0.332**	
6.	Experience in fisheries	0.248*	
7.	Annual Income	0.582**	
8.	Social participation	0.001(NS)	
9.	Cosmopoliteness	0.016 (NS)	
10.	Extension contact	0.421**	
11.	Information source exposure	0.446**	
12.	Credibility of information source	0.594**	
13.	Training exposure	0.260*	
14.	Information management behaviour	0.548**	

**Significant at 1 % level / *Significant at 5 % level

found to have positive and significant relationship with the adoption of scientific fish farming practices of the fish farmers'.

To determine proper contribution of the independent variables towards adoption of scientific fish farming practices of the fish farmers, step wise regression was applied and results are presented in Table 3. The regression coefficient for the variables such as annual income, credibility of information source and achievement motivation was found to have significant influence on the adoption of scientific fish farming practices at 5% level of significance. However, the rest of the variables had no significant influence towards the adoption of scientific fish farming practices. The R square value of the step wise regression model was found to be 0.559.

The problems faced by the fish farmers regarding adoption of scientific fish farming have been presented in Table 4. The poor economic condition was a major problem as reported by the majority of the fish farmers (68.75%) followed by flood which was also a major barrier as reported by half of the respondents (50%). Apart from that a sizable proportion, 46.25% and 43. 75% of the respondents admitted the problems like inadequate extension contact and no access to credits, respectively. Problems are also shown in figure 1.

Table 3: Association between adoption of scientific fish farming practices of the fish farmers and the independent variables

	Unstandardized Coefficients	Standardized Coefficients		t value	Level of
	B	Std. Error	Beta		Significance
(Constant)	-34.958	12.185		-2.869	0.005
Annual income	3.702	0.748	0.433	4.948	0.000
Credibility of information source	0.459	0.101	0.399	4.567	0.000
Achievement motivation	1.430	0.642	0.170	2.226	0.029
	R Square= 0.559	Adjusted R Square= 0.542	F = 32.101		

Table 4: Problems perceived by the fish farmers

SN	Problems	*Frequency	*Percentage
1.	Flood	40	50.00
2.	Lack of farming Knowledge	25	31.25
3.	Inadequate extension contact	37	46.25
4.	Poor economic condition	55	68.75
5.	Poaching	8	10.00
6.	No access to credit	35	43.75
7.	Occurrence of fish disease	28	35.00
8.	Unavailability of seed	30	37.50

Multiple response*

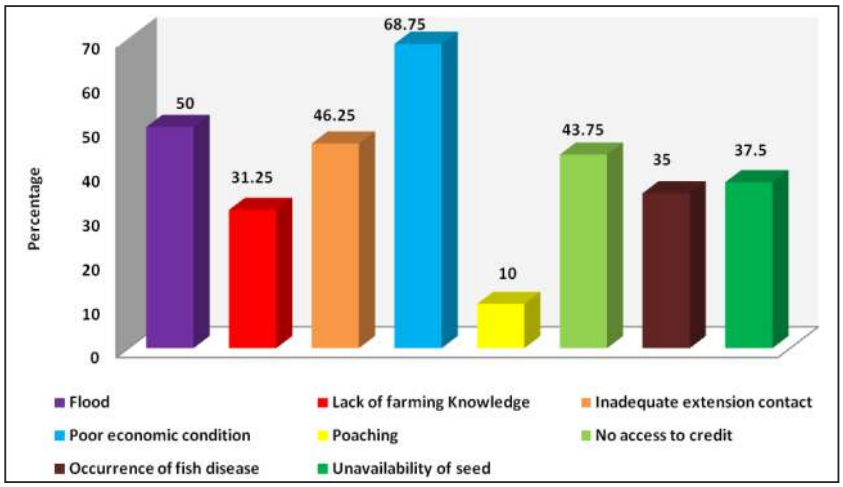

Fig..1: Problems faced by the fish farmers in adoption of scientific fish farming

Table 5: Problems perceived by the fish farmers

SN	Suggestions given by the fish farmers	Frequency	Percentage
1.	Government should take initiatives in flood affected areas of the state.	35	43.75
2.	Extension personnel should visit fish farmers timely to provide the needed skill, guide and organize programmes that will inspire fish farmers on adoption of technologies to boost fish production	18	22.50
3.	Extension agents should increase the rate of conducting need based training programmes on fish farming	20	25.00
4.	Government should provide various aids, and loan to poor farming community	40	50.00
5.	Government should keep eye on illegal transportation of fish seed	5	6.25
6.	The government through the extension agents should enlighten fish farmers in various ways by raising funds	15	18.75
7.	Awareness programmes should be done on fish disease prevention	22	27.50
8.	For quality seed production construction of adequate number of hatcheries should be done by the department of fisheries	10	12.50

Multiple response*

It could be seen from the results furnished in Table 5 that half of the respondents suggested government should provide various aids, and loan to poor farming community this may be due to the fact that most of the fish farmers had low economic condition. 43.75% of the respondents suggested that government should take initiatives in flood affected areas of the state. Respondents (27.50%) also suggested for conducting awareness programmes on fish disease prevention. 25% of the respondents suggested to increase the rate of conducting need based training programmes on fish farming.

CONCLUSION

Fish farming is an effective business which can provide the way of livelihood for millions of people in the country if practiced in an organized manner by adopting necessary scientific farming technologies. The present study revealed that majority of the respondent fish farmers did not adopted the recommended scientific fish farming practices. Only practices like periodical application of cow dung or any other organic manure, mixed farming with other compatible fish species and use of lime during pond preparation were found to be fully adopted by the respondents. The factors like annual income, extension contact, experience in fisheries, economic motivation and information source exposure, credibility of information source, training exposure and information management behaviour were found to have positive and significant relationship with the adoption of scientific fish farming practices of the fish farmers. In case adoption of scientific fish farming practices of the respondents, annual income, credibility of information source and achievement motivation were the best predictors to the total explained variation of 32.10%. Half of the respondents suggested government should provide various aids and loans to poor farming community due to the fact that most of the fish farmers had low economic condition which hampers the easy accessibility to scientific fish farming. Respondents also suggested for taking initiatives in flood affected areas of the state as flood directly or indirectly affects the farming system.

REFERENCES

Anonymous (2014). Fisheries Statistics (2013-14). Department of Fisheries, Government of Tripura, http://fisheries.tripura.gov.in/statistics.html. Accessed on 10 June, 2018.

Debnath, B., Biradar, R.S., Pandey, S.K., Krishnan, M. and Shyam, S.Salim. (2013). Present Status and Prospects of Fisheries Resources, Fish Seed and Fish availability in Tripura*, Journal of Fisheries Economics and Development*, 14(1): 30-41

Ekong, E.E. (2002). An Introduction to Rural Sociology, *Jumak Publisher, Nigeria,* Pp: 55 – 57.

Kumaran, M., Ravichandran, P., Gupta, B.P. and Nagavel, A. (2003). Shrimp farming practices and its socio-economic consequences in east Godavari district, Andhra Pradesh, India: A Case study. *Aquaculture Asia,* **8**(3): 48-52.

Suchiradipta, B. and Saravanan, R. (2017). Agricultural Extension Systems in Tripura. Working Paper 1, MANAGE Centre for Agricultural Extension Innovations, Reforms and Agripreneurship, National Institute for Agricultural Extension Management (MANAGE), Rajendranagar, Hyderabad, India, Pp: 44-45.

Received: July 22, 2018
Accepted: July 29, 2019