Knowledge Level of the Fish Farmers in Tripura Regarding Scientific Fish Production Practices

Biswarup Saha
Department of Fisheries Extension, College of Fisheries (CAU), Lembucherra, Tripura-799210

ABSTRACT

Fisheries are an important activity in Tripura, both from economic and nutritional point of view, providing income, employment and food security to the people. Tripura holds the first rank in per capita fish consumption as inland state and is also reported to be experienced highest retail price of fish per kg, in India. However, current level of fish produced in the state is not able to meet the burgeoning demand and hence large amount of fish is being brought from other state of India and Bangladesh. Therefore to identify the extent of knowledge and adoption of improved production practices among farmers, the study was conducted using ex-post facto research design in the purposively selected districts of South Tripura and West Tripura. Two blocks from each district and five villages from each block were selected by simple random sampling method. Ten fish farmers were selected randomly from each village. Thus, total 200 fish farmers were the respondents for the study. The knowledge index was found 54.25. Maximum knowledge gap was found in water exchange and quality monitoring followed by fish handling, storage, transportation, liming and feeding management. Farmers didn’t have proper knowledge regarding water quality such as pH, temperature, DO etc. Among the aquafarmers, the variables viz., education, institutional, infrastructural utilization, share of fisheries to total income, training programme attained, risk taking behavior, innovativeness, extension contact, mass media exposure were found to have positive relation with knowledge of farmers, which indicated that when these scores improve, the knowledge could be more and vice versa. A systematic non-formal educational approaches coupled with research on low cost balanced fish feed formulation and wider availability of quality seed are utmost required to achieve the self sufficiency in fish production in the state.

Key words: Scientific fish production practices, Knowledge index, Knowledge gap

INTRODUCTION

Fish has occupied an important place in the global market as a safe and cheap source of animal protein with high consumer acceptability. Fisheries and aquaculture are an important economic activity in Tripura, providing income and employment. Around 95 per cent population in Tripura is fish eater and the state experienced highest retail price of fish per kg in India. Around 1.25 lakh people depend on fisheries for their livelihood. The existing total aquatic resources of the state estimated to be 21,169 ha. However, current level of fish produced in the state is not able to meet the burgeoning demand and hence large amount of fish is being brought from the mainland state i.e.; West Bengal, Andhra Pradesh, Bihar and even from neighbouring Bangladesh. The total production of fish in the state during 2008-09 was about 36,995 metric tonnes against the demand of 40,656 metric tonnes. The scope for horizontal expansion in aquaculture is limited in the state due to hilly topography as well as wide coverage of forest area. Therefore, to reduce the gap between demand and supply and to achieve fish self-sufficiency in the state, importance is given to explore the vertical expansion in fish production. Pond fish production depends upon various inputs used and the nature of production practices and types of water bodies. Production practices and input uses depend on changes in technology, socio-economic environment and development policies on the production area. They are together responsible for affecting pond fish production.

The principle behind the scientific fish culture or improved practices for fish production is to produce maximum quantity of fish per unit area from a
scientifically managed water body by stocking fast growing, economically important, compatible species having shortest food chain utilizing the all ecological niches of the water body. However, a large number of the people in the state practice fish culture only for their domestic consumption without applying the scientific production practices of fish resulting into poor yield. It is thought that the low productions could be increased manifold through proper management. In view of this situation the present study was conducted to know the level of knowledge of fish farmers on modern pond fish culture technologies in the study area.

MATERIALS AND METHODS

The study was conducted using ex-post facto research design in the purposively selected districts South Tripura and West Tripura. Two blocks from each district were selected purposively and five villages were selected from each block using simple random sampling method. Ten fish farmers were selected from each village using simple random sampling method. Thus, a total 200 fish farmer constituted the respondents for the study. The improved practices of carp production were prepared and grouped into some domain such as pond preparation, liming, manuring the pond, stocking, post stocking feeding and management, water exchange and quality monitoring, use of aerators, health monitoring and management, handling-storage & transportation. Before going to final data collection, a pilot study was carried out and accordingly appropriate changes in the construction and sequence of interview schedule were made. The schedule was administered to the respondents and the responses were recorded. Knowledge level of the respondents regarding improved production practices of carp was measured through a test developed on the lines enunciated by Lindquist (1951) with some modification. The procedure adopted for constructing knowledge test consisted of the following steps:

(a) Collection of items: The content of knowledge test is composed of questions called items. A comprehensive list of ninety three items regarding the improved practices of carp production including pond preparation, liming, manuring the pond, stocking, post stocking feeding and management, water exchange and quality monitoring, use of aerators, health monitoring and management, handling-storage & transportation were prepared from the pertinent literature, personal experience, discussions held with the experts of College of Fisheries, Lembucherra, Tripura(W) and pilot study conducted in the area of investigation. The items were edited and drafted in such a way that each item highlighted only one idea and did not have any ambiguity. Total 93 items were selected. All the items were logical sequenced. The selection of the items was done on the basis of the following criteria:

- It should promote thinking
- It should have a certain difficulty
- It should differentiate the well informed from the less knowledgeable

(b) Jury opinion: These 93 items were sent to the twenty experts. The experts were requested to check each item carefully whether the items were really measuring the knowledge of the respondents about fish production or not. They had, of course, liberty to add/delete or modify any of the items. After considering the opinion of the experts, 88 items representing improved practices of carp production at Tripura condition were retained in the knowledge test. The 88 items formed the initial test battery to carry out item’s analysis for the development of a standardised knowledge test.

(d) Form of questions: All the eighty eight items collected as per procedure were used for the construction of the knowledge test. The questions were objective type and dichotomous. This was done to facilitate scoring more easy and objective.

(e) Pre-testing and item analysis: The preliminary test consisting of 88 items were administered to 40 identical respondents who were not included in sample but they were included in pre-testing. Each statement had two response categories-either correct or wrong. Each correct answer was given ‘1’ score while wrong answer was awarded ‘0’ score. Thus total score secured by all individual respondents on 88 items for correct answers was the knowledge score. These responses were subjected to difficulty index, discrimination index and point-bi-serial correlation. The procedure followed was given as below:
Difficulty index: Simple index of item’s difficulty is the percentage of respondents answering an item correctly. The assumption in this item index of difficulty was that the difficulty is linearly related to the level of respondents’ knowledge about improved practices of carp production. The difficulty of an item varied from individual to individual. When a respondent answers an item correctly, it was assumed that the item was less difficult than his ability to cope with it. The assumption in this item statistic of difficulty was that the difficulty was linearly related to the level of respondent’s knowledge about improved practices of carp production.

The difficulty index for each of the 88 items was calculated by dividing the total correct responses for a particular item by total number of respondents as under:

\[
DI = \frac{NC}{n}
\]

where,

- \(DI\) = difficulty index,
- \(NC\) = number of respondents answering correctly, and
- \(n\) = total number of respondents

Discrimination index: If a statement is answered by some respondents correctly and not by others, such a statement has greater power to discriminate more knowledgeable from the less one than another statement which is either answered correctly by everyone or none in the sample. If a statement is so simple that it is correctly answerable by everyone or too difficult to be correctly answerable by none, it does not have the power to discriminate the respondents with varying level of knowledge. Thus, the items carrying higher discrimination power logically explain that such items are difficult to answer, as they discriminate the ones who answer it correctly than those who are unable to do so. The discrimination indices of all the 80 raw items were worked out by the following method.

The respondents were arranged in descending order on the basis of their performance in the whole test. Out of this list, top 25 per cent and bottom 25 per cent of the respondents were treated as high and low groups. For each question, the number of top 25 per cent (\(NH\)) and bottom 25 per cent (\(NL\)) who answered it correctly, were counted. The discrimination index was calculated as under:

\[
DI = \frac{NH - NL}{N}
\]

where,

- \(DI\) = discrimination index,
- \(NH\) = number of respondents in 25 per cent high group who answered correctly,
- \(NL\) = number of respondents in 25 per cent low group who answered correctly, and
- \(N\) = total number of respondents

Point bi-serial correlation: The main aim of calculating point biserial correlation was to work out the internal consistency of the items, i.e., the relationship of the total score to a dichotomized answer to any given item. In the way, the validity power of the item was computed by the correlation of the individual item of the whole test. The point bi-serial correlation for each of the item of preliminary knowledge test was calculated by using the formula suggested by Garrett (1966):

\[
r_{pb} = \frac{M_p - M_q}{\sigma} \times p \times q
\]

where,

- \(r_{pb}\) = point bi-serial correlation,
- \(M_p\) = mean of the total score of the respondents who answered the item correctly,
- \(M_q\) = mean of the total score of the respondents who answered the item incorrectly,
- \(\sigma\) = standard deviation of the entire sample,
- \(p\) = proportion of the respondents giving correct answer to the item, and
- \(q\) = proportion of the respondents giving incorrect answers to the item.

The calculated point bi-serial correlations were tested with the help of the table for \((N-2)\) degrees of freedom.

(f) Final selection of item: All the items having difficulty index between 0.25 to 0.75, discrimination
Table 1. Distribution of respondents according to their level of knowledge about recommended improved production technology of carp

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Variables</th>
<th>Level</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Knowledge Index</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Knowledge</td>
<td>Low (up to 48)</td>
<td>50</td>
<td>25.0</td>
<td>Over all knowledge index of the study area= 54.25</td>
<td>5.629</td>
</tr>
<tr>
<td></td>
<td>Lower medium (49-54)</td>
<td>50</td>
<td>25.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper medium(55-59)</td>
<td>62</td>
<td>31.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High (more than 59)</td>
<td>38</td>
<td>19.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

index above 0.20 and significant point bi-serial correlations were finally selected for the final knowledge test. Though, the aforesaid criteria were the main considerations for the final selection of the knowledge items, yet care was taken not to eliminate the important aspects if any. For this purpose experts’ opinion about the items was considered. Thus, in light to the four criteria, described above, 39 items were finally selected including the areas of including pond preparation, liming, manuring the pond, stocking, post stocking feeding and management, water exchange and quality monitoring, use of aerators, health monitoring and management, handling-storage & transportation, which formed actual (final) format of the knowledge test.

**RESULTS AND DISCUSSION**

**Distribution of respondents according to their level of knowledge about recommended improved production technology of carp:** In the present study Knowledge was operationised as the extent to which understood information possessed by the respondents about the recommended practices of fish production in the study areas. The findings presented in Table 1 revealed that majority of the respondents (50%) had either low or lower medium knowledge of improved carp production practices. It was also evident from the table that 31 per cent of the respondents were in upper medium category while only 19 per cent of them had good knowledge of improved production practices of carp.

The mean score of the knowledge was 54.25. Further investigation indicated that farmers were quite knowledgeable about the liming, manuring, control of aquatic weeds, controlling predators, recommended size of fish while stocking, use of supplementary feeds, size of fish while harvesting etc. They were moderately knowledgeable about the water quality monitoring in fish pond, use of grass to feed the grass carp and application of lime dose as per pH measurement. However, they did not know balanced feeding composition and recommended supplementary feeding dose in different species ratio, fish disease prevention and feeding habits of cultivable carps, which were important to increase the productivity per unit area. Hardly anybody knew about application of supplementary feeds as per fish biomass and proper manuring for plankton growth. So the next programmes should highlight on the weak points. This finding is in conformity with Nagarajaiah *et al.* (2005).

**Knowledge gap of the respondents regarding selected practices of recommended improved production technology of carp:** Figure 1 described the knowledge gap between the existing and recommended technologies of fish production in the study area. Maximum knowledge gap was seen in water exchange and quality monitoring followed by fish.
handling, storage and transportation and use of aerators. The poor knowledge was also found in post stocking and feeding management practices. Farmers didn’t have proper knowledge regarding water quality such as pH, temperature, DO etc. They didn’t know properly about the sanitization agent as well as process in the pond. The knowledge regarding application of aerator in water was also very poor. However, interestingly, some farmers often punched the pond water with bamboo when carps frequently gulping at the surface water particularly in morning hours without knowing the rationale.

**Relationship between knowledge of improved production practices of carp and traits of the fish farmers:** In order to find out the degree of relationship between the profile of respondents and extent of knowledge, Pearson correlation coefficients were worked out. The non-parametric statistic i.e.; Pearson correlation coefficients were used as the data were the qualitative in nature and the population is not normally distributed. To determine the strength of various characteristics influencing the level of adoption, the data were subjected to multiple regression analysis. The results were given in Table 2.

Among the aqua farmers, the variables viz., education, institutional infrastructural utilization, average yield, share of fisheries to total income, pond size, training programme attained, risk taking behavior, innovativeness, information management behavior were found to have positive relation with knowledge of farmers regarding improved practices of fish production, which indicated that when these scores improve, the knowledge could be more and vice versa. It is inferred that periodical training programme and continued extension and educational efforts would improve the knowledge of improved practices of fish production. The positive coefficient of educational level on adoption showed a relationship that educational

![Figure 1. Knowledge Gap of the respondents regarding selected practices of recommended improved production technology of carp](image-url)
### Table 2. Correlation and multiple regression analysis between traits of the fish farmers and knowledge

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Variables</th>
<th>Correlation coefficient</th>
<th>Regression coefficient</th>
<th>Se of b</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age</td>
<td>0.087</td>
<td>0.47</td>
<td>0.178</td>
<td>0.657</td>
</tr>
<tr>
<td>2.</td>
<td>Caste</td>
<td>0.094</td>
<td>0.118</td>
<td>0.077</td>
<td>1.687</td>
</tr>
<tr>
<td>3.</td>
<td>Education</td>
<td>0.127*</td>
<td>0.315</td>
<td>0.292</td>
<td>4.198**</td>
</tr>
<tr>
<td>4.</td>
<td>Family education</td>
<td>0.051</td>
<td>0.42</td>
<td>0.068</td>
<td>0.585</td>
</tr>
<tr>
<td>5.</td>
<td>Dependency ratio</td>
<td>0.63</td>
<td>-0.38</td>
<td>0.024</td>
<td>-0.936</td>
</tr>
<tr>
<td>6.</td>
<td>Institutional infrastructural utilisation</td>
<td>0.216**</td>
<td>0.269</td>
<td>0.167</td>
<td>3.816**</td>
</tr>
<tr>
<td>7.</td>
<td>Social participation</td>
<td>0.108</td>
<td>0.050</td>
<td>0.121</td>
<td>0.695</td>
</tr>
<tr>
<td>8.</td>
<td>Training programme attained</td>
<td>0.361**</td>
<td>0.298</td>
<td>0.170</td>
<td>3.927**</td>
</tr>
<tr>
<td>9.</td>
<td>Experience in fisheries</td>
<td>-0.052</td>
<td>-0.256</td>
<td>0.140</td>
<td>-2.778*</td>
</tr>
<tr>
<td>10.</td>
<td>Distance from market</td>
<td>0.076</td>
<td>0.127</td>
<td>0.087</td>
<td>1.325</td>
</tr>
<tr>
<td>11.</td>
<td>Average yield</td>
<td>0.159*</td>
<td>0.251</td>
<td>0.165</td>
<td>2.186*</td>
</tr>
<tr>
<td>12.</td>
<td>Pond size</td>
<td>0.269**</td>
<td>0.269</td>
<td>0.141</td>
<td>2.968*</td>
</tr>
<tr>
<td>13.</td>
<td>Potentiality to realize opportunity</td>
<td>0.127</td>
<td>0.019</td>
<td>0.070</td>
<td>0.253</td>
</tr>
<tr>
<td>14.</td>
<td>Share of fisheries to total income</td>
<td>0.298**</td>
<td>0.272</td>
<td>0.154</td>
<td>3.316**</td>
</tr>
<tr>
<td>15.</td>
<td>Access to credit</td>
<td>0.004</td>
<td>0.106</td>
<td>0.037</td>
<td>0.929</td>
</tr>
<tr>
<td>16.</td>
<td>Risk taking behaviour</td>
<td>0.272**</td>
<td>0.246</td>
<td>0.176</td>
<td>2.784*</td>
</tr>
<tr>
<td>17.</td>
<td>Innovativeness</td>
<td>0.251**</td>
<td>0.208</td>
<td>0.148</td>
<td>2.824*</td>
</tr>
<tr>
<td>18.</td>
<td>Aspiration</td>
<td>0.071</td>
<td>-0.056</td>
<td>0.073</td>
<td>-0.727</td>
</tr>
<tr>
<td>19.</td>
<td>Information management behaviour</td>
<td>0.237**</td>
<td>0.274</td>
<td>0.196</td>
<td>2.780*</td>
</tr>
</tbody>
</table>

*significant at 1 % level; **significant at 5 % level; $R^2=0.410$; $F=5.468**

Programmes for farmers should be sustained. In general, the level of education of the farmers could be related to the knowledge of improved practices. The less educated farmers were incapable of solving relatively simple technical problems and were highly dependent on outside assistance and through the lack of education and knowledge had unrealistic expectations. Technically demanding enterprise requires some capital and creative solutions to daily problems. Awareness exercise should also be continued so as to carry every farmer along in fish production technologies. Further, utilization of different institutional infrastructure would help the farmers to gain up to date knowledge through utilization of information sources and availing expert services. Risk taking behavior and innovativeness were found to be very important socio-psychological variables which need to be improved among the farmers through different non-formal educational activities. The entrepreneurial quality as well as achievement motivation needs to be encouraged among the fish farmers in the study area. The positive coefficient of knowledge with a high significant level called for higher share of fish culture to total income of the households, higher fish yield and larger pond size, which will directly and indirectly motivate the farmers to increase in the knowledge level-about fish production technology. It is expected that if the above recommendations are implemented, more farmers will evade the problem of lower production of fish in their ponds. More farmers will increase their income base and therefore a brighter economic future for their households in particular and that of the rural economy in general. However, the variable experience in fisheries was negatively correlated with knowledge score of the farmers. That may be due to the fact that the scientific orientation among age old farmers were very poor and they were very traditional in their thinking. The finding is in conformity with the findings of Jeeva et al., (2009). The $R^2$ value indicated that, all the variables taken together served as cause for 41% of variation in the adoption level. The significant F value revealed the overall significance of the regression.
CONCLUSION

Knowledge about improved technologies is essential for adoption of technologies. The mean score of the knowledge of the fish farmers was found 54.25, which is not a healthy sign as far as state department of fishery is concerned and suggests that there are a lot that need to be done in the extension system with regard to empowering the farmers educationally. Majority of farmers did not know balanced feeding composition and recommended supplementary feeding dose in different species ratio, fish disease prevention and feeding habits of cultivable carps, which were important to increase the productivity per unit area. Hardly anybody knew about application of supplementary feeds as per fish biomass and proper manuring for plankton growth. So the next programmes should highlight on the weak points. To increase the level of adoption of improved technologies knowledge about the new technology has to be improved by undertaking various extension approaches.

To enable the farmers acquiring the knowledge on improve production practices of carp, it is worth to increase the risk taking ability, favourable attitude towards fish farming, information seeking, evaluation and preservation behaviour and training. Hence, it was suggested that the technology dissemination system must be focused on these variables by organizing campaigns, field day, demonstration, exhibitions, Kisan Gosti, Kisan Mela, extension talk, etc. so that farmers could acquire latest knowledge on improved production practices of carp. Target oriented training programme have to be formulated to enhance the level of knowledge and improve the skill of recommended practices of carp production. Extension agencies have to be more active in providing several exposures to the fish growers regarding scientific production practices.

REFERENCES


Received on October, 2010, Revised on February, 2011