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Assessment of knowledge level of fish farmers about improved fish farming practices in Dhamtari district of Chhattisgarh

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Abstract

Fish farming plays a vital role in contributing to worldwide food security and economic advantages to fishers and other stakeholders engaged in the fisheries sector. In India, fisheries sector shows substantial growth in inland fisheries that promotes employment opportunities and livelihoods throughout the nation. The immense inland water resources of Chhattisgarh are predominantly utilized for fisheries activity such as pond culture, riverine and reservoir fisheries. The present study was conducted in all four blocks of Dhamtari district in Chhattisgarh. From the four blocks, a total of 150 fish farmers were selected by using a proportionate stratified random sampling technique. Data were collected by personal interview method with the help of an interview schedule and collected data were classified, tabulated and analysed after subjecting the data using appropriate statistical tools and techniques. The study revealed that 67.33 percent fish farmers fell under the medium level of knowledge followed by 18.67 percent fell under the low level of knowledge, whereas only 14.00 percent respondents were having high level of knowledge respectively. Further the study evaluated seven major knowledge-based aspects i.e. pond construction, pond management, water quality parameters, seed stocking, supplementary feeding, fish health management and miscellaneous scientific practices. The findings reveals that fish farmers possessed the highest knowledge in supplementary feeding (MPS=70.83), followed by seed stocking (MPS=67.60), whereas knowledge on water quality parameters was the lowest (MPS=59.62). Furthermore, the overall knowledge level of fish farmers was found with 65.57 MPS in the study area. It is suggested that educate the fish farmers in these areas would be essential for improving the fish production, sustainable use of resources and improving their livelihood, leading to the overall development of fisheries communities.

Keywords: Knowledge level, fish farmers, farming practices

Introduction

Fish serve as an essential dietary food in worldwide food systems since they are easily accessible and their nutritional aspects include protein content and essential fatty acids along with various micronutrients. During recent decades, the fisheries sector in India experienced substantial growth to become an essential economic element of its agrarian economy (FAO, 2024) [6]. The sector creates employment opportunities across aquaculture practice and supplementation industries thus driving support to supply chain partners which enhances livelihood sustainability and further helps to reduce poverty and distribute resources equitably. Strategic development of fisheries promotes national goals to maximize aquatic resource use for meeting domestic nutritional needs and international marketplace requirements which generates sustainable economic and ecological results (Anonymous, 2023) [3].

In Chhattisgarh state, approximately 2.20 lakh individuals are employed in the fisheries sector, with a majority of hailing from underprivileged segments of society. The state's fisheries predominantly rely on culture-based methods, with major carp species playing a pivotal role. The presence of 126766 ponds, encompassing 1.201 lakh hectares of water area, serves as the primary basis for culture fisheries (Anonymous, 2023) [3]. Inland culture fisheries encompass various activities such as fish seed production, fingerling rearing, and the brood stock management. In context of India's inland fish production, Chhattisgarh state holds the sixth position with annual production of 6.52 lakh tonnes and increased yield upto 4021 kg/ha in year 2022-23 (DoF, 2023) [4]. The Dhamtari district having 3612 registered community and private ponds which were spreading throughout four blocks of the district and actively engaged in fish culture with the participation of local fishermen's communities with production of 21699 thousand tonnes was in year 2023.

To increase the entrepreneurial behaviour of fish farmers in rural settings, it is essential to measure their knowledge level about fish farming. This would provide a foundation for future extension initiatives (Sori *et al.* 2015) [11]. Knowledge of scientific fish farming practices is an important component which helps in increasing fish productivity. In particular the study area limited research has been conducted on such topic. For the adoption of

scientific practices, knowledge and awareness of the fish farmers are important factors to improve their livelihood and sustainable development. Keeping all these views in mind, the present investigation entitled "Assessment of Knowledge level of fish farmers about improved fish farming practices in Dhamtari district of Chhattisgarh" was undertaken for the study purpose.

Materials and Methods

The present study was carried out with covering of all four blocks of the Dhamtari district *i.e.* Kurud, Dhamtari, Magarlod and Nagri. A total of 150 fish farmers were selected by using the 'proportionate stratified random sampling technique' for the study purpose.The data were collected by the personal interview method with the help of pre-tested interview schedule and collected data were classified, tabulated and analysed after subjecting the data by using appropriate statistical tools *i.e.*SPSS, mean, standard deviation, mean percent score *etc*. For measuring the knowledge level, interview schedule was developed on the basis of reviewed relevant literature, personal experience and discussion with subject experts. Seven major aspects were included in the knowledge statement *i.e.* construction of pond, management of the pond, water quality parameters, stocking of seed, supplementary feeding, fish health management and miscellaneous. Each aspect was divided into several questions and sub questions for knowledge assessment. Hence, a total of seven major aspects were divided in to 41 knowledge-based questions. The respondents were awarded one score for each right answer and zero for each wrong answer. Therefore, the possible maximum obtainable knowledge score was forty-nine and minimum score was zero. The responses obtained from the respondents were counted and converted in to mean percent score. The knowledge index for each respondent was calculated by using following formula:

$$\text{Knowledge index} = \frac{\text{Knowledege score obtained by fish farmers}}{\text{Maximum obtainable score}} \times 100$$

Knowledge scores were computed for classifying the knowledge in to different categories. Based on the mean knowledge score and standard deviation the respondents were classified in to three categories *i.e.* low, medium and high knowledge level. Further, the aspect-wise knowledge level of fish farmers was also analyzed separately. The relative importance of all the seven knowledge aspects were highlighted by ranking them on the basis of their mean percent score of knowledge level about improved fish farming practices.

Results

Knowledge level of fish farmers about improved fish farming practices

The data presented in Table 1 reveals that 67.33 percent fish farmers fell under the medium level of knowledge followed by 18.67 percent fell under the low level of knowledge whereas only 14.00 percent respondents were having high level of knowledge respectively. The finding shows that majority of the fish farmers were having medium level of knowledge regarding improved fish farming practices.

Table 1: Distribution of fish farmers according to their knowledge level *n=150

S. No.	Knowledge level	Frequency	Percentage
1	Low (score below 25)	28	18.67
2	Medium (score from 25 to 37)	101	67.33
3	High (score above 37)	21	14.00
Total		150	100.00

$\bar{X}$=31.00, σ=6.00 *****n= Number of respondents

Aspect-wise knowledge level of fish farmers

The data depicted in Table 2 reveals that majority of the fish farmers were having highest knowledge about the proper depth of pond, appropriate size of the pond, source of water and consult for pond construction which were fell under the aspects of 'construction of pond'. Likewise, the aspects 'management of the pond', fish farmers were having good knowledge about the methods of weed management, fish species which help in controlling aquatic weeds and benefits of removing weeds from the pond. Further in the aspects of 'water quality parameters', the fish farmers had significant knowledge on control of pH in pond, dissolved oxygen (DO) depleted in the pond water as well as control mortality of fishes during high temperature. In case of 'stocking of seed', the fish farmers were having highest knowledge on size of fingerling to be stocked for grow-out culture, acclimatization and stocking time of fish seeds. Similarly, in the 'supplementary feeding' aspects, the farmers had good knowledge on feed ingredients, type of feeding methods and feeding rate during 1st and 2nd month of culture. In case of 'fish health management' aspects, the fish farmers were having high knowledge on use of CIFAX & $KMnO_4$and methods used for treatment of parasitic diseases. Whereas in the 'miscellaneous' aspects, fish farmers were having good knowledge on gulping behaviour of fish, importance of sunlight in fish culture and preferred fish species for pond culture.

Table 2: Aspect-wise knowledge level of fish farmers about improved fish farming practices n=150 (Multiple response)

S. No.	Knowledge aspects	Mean score	Rank
A	**Construction of pond**		
1	What should be the proper depth of pond	84.00	I
2	Do you know about the appropriate size of fish pond? If yes, please tell the size of fish pond which is profitable for aquaculture	80.00	II
3	What is the source of water in your pond	76.67	III
4	Whom do you consult for pond construction	68.00	IV
5	Do you use any manure and fertilizer in pond? If yes, please tell about any names	64.67	V
6	How much manure do you apply to the pond?	60.00	VI
7	Did you get any subsidy for pond construction and farm inputs	30.00	VII
B	**Management of the pond**		
1	Common method used for weed clearancefollowed by you	93.33	I

2	Methods of weed management	91.33	II
3	Which fish helps in controlling aquatic weeds	66.00	III
4	Weed control is essential for fish culture?	40.00	IV
5	Sun drying of ponds is an effective method	35.33	V
C	**Water quality parameters**		
1	How do you control of pH in pond?	90.00	I
2	How do you identify that the dissolved oxygen (DO) is depleted in the pond water?	86.67	II
3	What measures do you follow if the mortality of fish occurs due to high temperatures?	80.00	III
4	Ideal temperature of pond water	77.33	IV
5	How do you measure water quality parameters in a pond	36.67	V
6	What should be water pH in pond?	28.67	VI
7	Do you know about any methods to increase DO?	18.00	VII
D	**Stocking of seed**		
1	How much size of fingerlings are stocked for grow-out culture	85.33	I
2	Do you know about acclimatization	81.33	II
3	Fish seed should be stocked at which time	68.00	III
4	How much seed should be stocked in 1 hectare	60.00	IV
5	What should be the ratio of fish species stocked in the pond	43.33	V
E	**Supplementary feeding**		
1	Do you know about any feed ingredients used by you	89.33	I
2	What type of feeding method have you chosen	88.00	II
3	Feeding rate during 1-2 month of culture should be	87.33	III
4	What should be the suitable timing for feeding fish	80.67	IV
5	Do you follow periodic sampling of fish at the end of every month	59.33	V
6	Do you know about types of feed	20.67	VI
F	**Fish health management**		
1	Do you use CIFAX? If yes, in which condition or symptoms do you use and dose of CIFAX	81.33	I
2	Do you know about CIFAX and $KMnO_4$	74.00	II
3	What medicine/chemical do you use for the removal of fish louse	71.33	III
4	Do you know about any fish parasites	66.00	IV
5	How do you identify diseased fish?Please tell me about any symptoms	51.33	V
6	What would be the rate of sampling to check the health of fish	30.00	VI
G	**Miscellaneous**		
1	During cloudy days, fishes come-up gulping for air due to poor dissolved oxygen in water.	92.67	I
2	Sunlight is necessary for fish farming? If yes please tell about any one benefit of sunlight	91.33	II
3	Which preferred fish species are cultured by you?	82.00	III
4	Sometimes green layer noticed on the water surface of the pond. If yes, tell about what possible steps taken by you?	56.00	IV
5	Please tell about the name of any piscicide	14.00	V

Aspect-wise overall knowledge level of fish farmers about improved fish farming practices

The depicted in Table 3 reveals that the fish farmers had highest knowledge about 'supplementary feeding' with mean percent score of 70.83 and assigned ranked as first. The second highest ranked was accorded to the 'stocking of seed' with mean percent score of 67.60. Likewise, the 'miscellaneous' (MPS=67.20), 'construction of pond' (MPS=66.20), 'management of pond' (MPS=65.20), 'fish health management' (MPS=62.33) and 'water quality parameters' (MPS=59.62) which were assigned ranked as third, fourth, fifth, sixth and seventh, respectively. Furthermore, the overall knowledge level of fish farmers was found with mean percent score of 65.57 about improved fish farming practices.

Table 3: Aspect-wise overall knowledge level of fish farmers about improved fish farming practices n=150 (Multiple response)

S. No.	Components	MPS	Rank
1.	Supplementary feeding	70.83	I
2.	Stocking of seed	67.60	II
3.	Miscellaneous	67.20	III
4.	Construction of pond	66.20	IV
5.	Management of the pond	65.20	V
6.	Fish health management	62.33	VI
7.	Water quality parameters	59.62	VII
Overall knowledge level		65.57	

MPS=Mean percent score

Discussion

The results indicates that majority of the fish farmers had medium level of knowledge about improved fish farming practices. It means the fish farmers had a basic understanding of improved fish farming techniques but may still require additional technical guidance and information to

adopt the improved fish farming practices. The results were in line with the findings of Sasmal *et al.* (2006) [10], Dhage *et al.* (2012) [5], Adisoji & Kerere (2013) [1] and Samantaray *et al.* (2023) [9].

Further the aspect-wise overall knowledge level of fish farmers *i.e.,* 'supplementary feeding', 'stocking of seed', 'miscellaneous' and 'construction of pond' were above the average mean percent score (MPS=65.57). Hence, it can be said that the fish farmers were having good knowledge level in the above knowledge aspects. Further, the fish farmers were understand that proper feeding which is directly linked to fish growth and type & quantity of fish feed directly affect the income. The fish farmers are also familiar with the quantity and proper size of fish seed to be stocked in their pond. Also, the fish farmers had good knowledge of preferred fish species, benefits of sunlight in fish farming and gulping behaviour of fish.

In case of knowledge aspects like 'management of the pond', 'fish health management' and 'water quality parameters' were below the average mean percentage score of knowledge, indicating that least knowledge level about these aspects. One of the important aspects was 'management of the pond' observed that the majority of fish farmers had comparatively low knowledge in pond management practices. Likewise, the least knowledge towards 'fish health management' indicates a need for improvement in disease prevention and health management practices to minimize the losses. Whereas, the lowest scored on 'water quality parameters' highlights a significant knowledge gap on maintaining optimal water quality, which is important for the survival and growth of fishes.The results were similar to the findings of Adisoji & Kerere (2013) [1], Sakib *et al.* (2014) [8], Rathore (2014) [7], Sori *et al.* (2015) [11], Alam *et al.* (2017) [2], Ssekyanzi *et al.* (2022) [12] and Samantaray *et al.* (2023) [9].

Conclusion

Findings concludes that majority of fish farmers had a medium level of knowledge about improved fish farming practices. The farmers proved that considerable knowledge in major aspects *i.e.* supplementary feeding, seed stocking and pond construction. Whereas, the least knowledge was found in the aspects of pond management, fish health management and water quality parameters. Hence, it may be suggested that need-based training programmes and technical guidance should be provided by the subject experts to enhance the knowledge level of fish farmers as a result of more adopt the scientific fish farming practices ultimately their fish production will also increased whereby improve their livelihood status as well as overall development of the fish farming community in study area.

Conflict of Interest: None.

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