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Knowledge of farmers about improved fish farming practices in Rohtas district of Bihar

[1]Rahul Kumar Singh and [2]Dr. Dipak Kumar Bose

[1, 2]Researcher, Associate Dean, (NAI) & Professor, Department of Agricultural Extension and Communication, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj, Uttar Pradesh, India

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Corresponding Author: Rahul Kumar Singh

Abstract

Indian cuisines heavily rely on fish farming, with aquaculture and caught fisheries serving as major supplies. India contributes to food production, employment, and foreign exchange by being the world's second-largest fish producer, behind China. The purpose of a research was to ascertain how much fish farmers knew about better techniques for raising fish. The study aimed to understand the knowledge of Indian fish farmers about improved fish farming practices. The research used a descriptive research design and a multi-stage sampling technique According to the poll, participants are well-versed in the economic, sustainable, and breeding elements of fish farming. Regulations controlling fish farming, water temperature, and water quality factors are a few examples of areas that might want improvement. While maintaining the wellbeing and health of their fish populations, filling up these gaps can improve the sustainability and financial success of fish farming businesses.

Keywords: Fish farming, knowledge, aquaculture, fish population health, employment

Introduction

Fish is a crucial part of Indian diets, with aquaculture and captured fisheries being key sources. Aquaculture can combat poverty and reduce inequality, potentially doubling farmers' income with proper training and technologies. India is the second largest fish producer after China, contributing to food production, employment, and foreign exchange. The sector supports over 28 million people, particularly from marginalized communities. Freshwater fishing accounts for 55% of total fish production, with a 17-fold increase in production from 1950-51 to 2018-19. India's per capita fish consumption is estimated at 5-6 kg, with fish-eating populations at 8-9 kg (Choudhary and Saini (2018) [5].

In 2023 the world fish production reached 206.3 million tonnes, with 89.4 million tons coming from aquaculture. Aquaculture produced the largest amount in fresh water (54.4 million tons), accounting for 62.2% of the world total. Despite the COVID-19 pandemic, aquaculture production remained steady, with finfish farming accounting for the largest share for decades. Farmed finfish reached 57.5 million tonnes (146.1 billion USD). (www.fisheries.bihar.gov.in).

Bihar, an eastern Indian state, has a significant fish production gap, with annual aquaculture production of around 762,000 tons in 2021-22. However, the state's fish consumption is lower than the ICMR's 11.2kg per year recommendation. Bihar's abundant natural freshwater resources and flourishing inland fish market make it ripe for aquaculture, which has untapped potential for equitable economic opportunities. The Bihar government is working to change this by organizing women from low-income households into self-help groups (SHG) -based fish farmer producer groups (FFPGs). JEEViKA, the State Rural Livelihood Mission of Bihar, focuses on the socioeconomic development of rural households through a three-tier structure of community-based organizations of women. The government provides free access to village ponds or tanks for five years, encouraging women-led community pond aquaculture. As of October 2023, the Bihar government has allotted 121 ponds to VOs across 29 districts and formed 91 FFPGs. 22 advanced and trained FFPGs have harvested more than 21 metric tons of fish, highlighting the potential of women-led aquaculture as a strong livelihood stream (Kaur & Singh (2023) [7].

Fish farming is a sustainable and environmentally friendly method that provides a sustainable source of protein and essential nutrients for millions of people worldwide. It offers numerous benefits, including increased food security, environmental sustainability, economic development, and innovation in areas such as genetics, nutrition, disease management, and production systems. However, it also faces challenges such as environmental impacts, disease management, and feed sustainability.

Pond aquaculture, a traditional method, uses earthen ponds or reservoirs to cultivate species like tilapia, carp, catfish, and shrimp. Cage aquaculture, on the other hand, involves the cultivation of fish in floating cages or net pens submerged in natural water bodies. This method allows for the intensive production of high-value species while minimizing environmental impacts.

Recirculating Aquaculture Systems (RAS) are a high-tech approach that uses advanced technologies to optimize water quality and minimize environmental impact. However, challenges include environmental impacts, disease management, and feed sustainability.

Future directions and innovations in aquaculture include aquaponics, selective breeding programs, and Integrated Multi-Trophic Aquaculture (IMTA). These methods aim to maximize resource utilization, minimize environmental impacts, and create more resilient and sustainable aquaculture systems.

Objectives of the study

1. To assess the socio-economic profile of the respondents
2. To find out the knowledge of the respondents about improved fish farming practices.

Research Methodology

The study used descriptive research design to describe the characteristics of a population or phenomenon being studied. The sampling technique was multi-stage, with Rohtas district being chosen due to its proximity and familiarity with the investigator. The study selected 19 blocks from Shivsagar block based on the maximum number of fish farmers and the maximum area covered under fish farming. Data collection was conducted using a survey method with pre-structured interview schedule. The study also selected dependent and independent variables based on available literature and expert opinions.

Results and Discussion

Table 1: Socio-economic profile of respondents. (N-120)

S. No.	Age	Frequency	Percentage
1	Young (Below 35 years)	21	17.50
2	Middle (35 to 55 years)	86	71.67
3	Old (Above 55 years)	13	10.83
Educational status			
1	Illiterate	21	17.50
2	Primary	18	15.00
3	Junior Higher Secondary	37	30.84
4	Higher Secondary	19	15.83
5	Inter School	21	17.50
6	Graduation & above	4	3.33
Occupation			
1	Agriculture	75	62.50
2	Agriculture + Labour	24	20.00
3	Agriculture + Business	15	12.50
4	Agriculture + Service	6	5.00
Family size			
1	Small Size	78	65.00
2	Medium Size	34	28.33
3	Large Size	8	6.67
Size of land holding			
1	Small (<2.5 acres)	26	21.67
2	Medium (2.5 – 5 acres)	42	35.00
3	Large (>5 acres)	52	43.33
Annual income			
1	Around 1 lakh	20	16.66
2	Between 1-2 lakh	79	65.83
3	Above 2 lakh	21	17.50
Mass media exposure			
1	Low (6-10)	14	11.67
2	Medium (11-14)	89	74.17
3	High (15-18)	17	14.16
Scientific orientation			
1	Low (6-8)	29	24.17
2	Medium (9-11)	61	50.83
3	High (12-14)	30	25.00
Irrigation source			
1	River	25	20.83
2	Well / Tube well	12	10.00
3	Canal	77	64.17
4	Lake/ Farm Pond	6	5.00
Risk bearing capacity			
1	Low (8-10)	28	23.33
2	Medium (11-13)	49	40.83
3	High (14-16)	43	35.84

The socio-economic analysis of the respondent are middle age, educated up-to junior higher secondary level of education, majority of the respondents were engaged in agriculture only, income is above 1 lakh rupees, majority of the respondents land holdings are above 5 acres, majority of the respondents have 3 years of fish farming experience and have medium level of mass media exposure, medium level of sources of agriculture information. Majority of the respondents had medium level of knowledge towards improved fish farming practices. Majority of the respondents had medium level of adoption towards improved fish farming practices. Out of eleven independent variables, i.e. age, education, occupation, annual income, land holding, farming experience, mass media exposure, sources of agriculture information, risk bearing capacity, scientific orientation and economic motivation were positively and significantly co-related with the knowledge and adoption towards improved fish farming practices.

Knowledge of the respondents for Fish Farming about improved fish farming practices: This part of the study deals with the existing status of knowledge of respondents of Rohtas district about improved fish farming practices. Knowledge as a body of understood information possessed by an individual is one of the important components of behavioral aspect. On this ground, it was realized imperative to examine the extent of knowledge of respondents about improved fish farming practices.

Table 2: Distribution of respondents according to their knowledge about improved fish farming practices, N=120

S. No.	Statements	Fully Correct		Partially Correct		Incorrect	
		f	Percentage	*f*	Percentage	*f*	Percentage
1.	Understand the basic principles of fish farming.	38	32	42	35	40	33
2.	Identify different species of fish suitable for farming.	38	32	50	42	32	27
3.	Know the appropriate water quality parameters for fish farming.	30	25	55	46	35	29
4.	Aware of the different types of fish farming systems (e.g., pond, cage, recirculating).	37	31	52	43	31	26
5.	Understand the importance of water temperature in fish farming.	24	20	57	48	39	33
6.	Knowledgeable about the feeding requirements of farmed fish.	45	38	44	37	31	26
7.	Recognize common diseases that affect farmed fish.	43	36	52	43	25	21
8.	Familiar with the use of antibiotics and other treatments in fish farming.	31	26	43	36	46	38
9.	Understand the breeding practices used in fish farming.	52	43	42	35	26	22
10.	Know the environmental impacts of fish farming.	32	27	37	31	51	43
11.	Aware of the regulations and standards governing fish farming.	33	28	52	43	35	29
12.	Understand the economic aspects of fish farming, including costs and profits.	51	43	48	40	21	18
13.	Familiar with the equipment and infrastructure needed for fish farming.	36	30	44	37	40	33
14.	Perform routine maintenance tasks on fish farming equipment.	41	34	46	38	33	28
15.	Know how to monitor and manage fish health.	48	40	42	35	30	25
16.	Understand the process of harvesting fish.	43	36	46	38	31	26
17.	Knowledgeable about the processing and marketing of farmed fish.	37	31	47	39	36	30
18.	Aware of the sustainability practices in fish farming.	53	44	44	37	23	19
19.	Identify and manage risks associated with fish farming.	36	30	42	35	42	35

The survey results indicate that respondents have a good understanding of fish farming practices, with a majority showing knowledge in breeding practices, sustainability, and economic aspects. However, there is room for improvement in areas such as water quality parameters, water temperature, and regulations governing fish farming.

In terms of breeding practices, respondents demonstrated a strong understanding of the different methods used in fish farming, such as natural spawning and induced breeding. They also showed awareness of the importance of genetic diversity in maintaining healthy fish populations. Additionally, respondents displayed knowledge of sustainable practices, such as using environmentally friendly feed and reducing waste in fish farming operations.

On the economic front, respondents showed an understanding of the financial aspects of fish farming, including the costs associated with setting up and maintaining a fish farm, as well as potential revenue streams from selling fish products. They also recognized the importance of market demand and pricing in determining the success of a fish farming operation.

However, the survey results also highlighted areas where respondents could benefit from further education and training. For example, many respondents struggled to accurately identify key water quality parameters, such as dissolved oxygen levels and pH levels, that are crucial for maintaining a healthy aquatic environment for fish. Similarly, respondents showed limited knowledge of how water temperature can impact fish health and growth in a farming setting.

Furthermore, respondents expressed confusion about the regulations governing fish farming, including permits and licenses required to operate a fish farm, as well as environmental regulations aimed at protecting water quality and wildlife habitats. This lack of understanding could potentially lead to compliance issues and legal challenges for fish farmers.

Overall, while respondents demonstrated a solid understanding of certain aspects of fish farming practices, there is clearly a need for further education and training to improve their knowledge in areas such as water quality parameters, water temperature, and regulatory compliance. By addressing these gaps in knowledge, fish farmers can enhance the sustainability and profitability of their operations while also ensuring the health and welfare of their fish populations. Similar finding is also reported by Kulkarni, Markad, Kunjir, Sutar and Meshre.

Table 3: Distribution of respondents on the basis of their knowledge level, N = 120

S. No.	Knowledge Level	frequency	Percentage
1	Low (18–30)	28	23.33
2	Medium (31-43)	61	50.84
3	High (44-56)	31	25.83
	Total	120	100.00

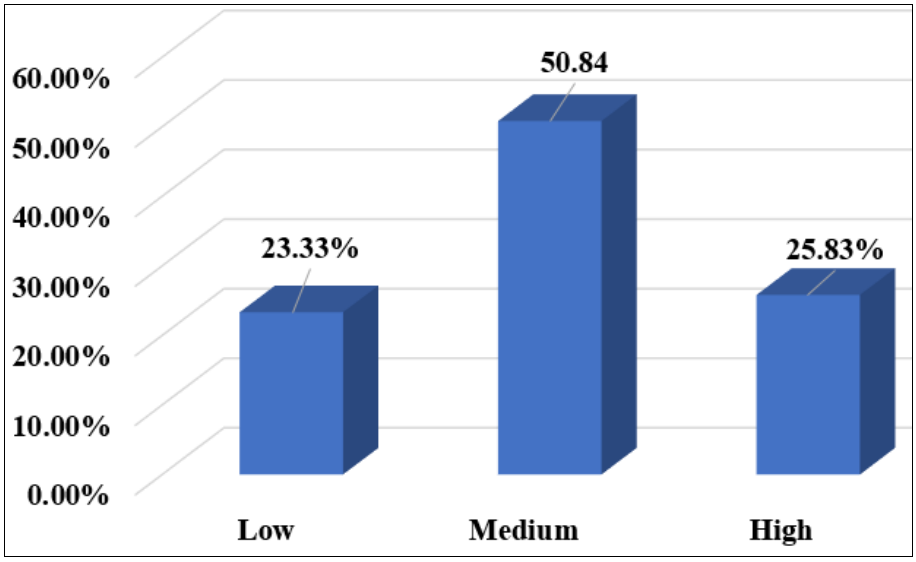

Fig 1: Distribution of Respondents across Low, Medium, and High Categories

Table 3 depicts that majority of the respondents 61 (50.83%) fell in the medium knowledge level group, whereas 25.83 percent respondents were observed in the high knowledge level group and remaining 23.33 percent respondents formed low knowledge level group. It is hereby concluded that majority of farmers were having medium level of knowledge followed by high and low knowledge level, respectively.

Table 4: Relationship between profile of Fish farmers with knowledge

S. No.	Independent variables	Correlation coefficient ®
		Knowledge
1.	Age	0.134^{NS}
2.	Marital status	0.022^{NS}
3.	Education	0.264*
4.	Occupation	0.342*
5.	Type of House	0.063^{NS}
6.	Size of land holding	0.339*
7.	Annual income	0.525**
8.	Family type	0.237*
9.	Mass media exposure	0.462**
10.	Risk bearing capacity	0.528**
11.	Progressiveness	0.477**
12.	Scientific Orientation	0.523**

*Significant at 0.05 percent level of probability
** Significant at 0.01 percent level of probability
NS=non-significant

Table 4 reveals that the independent variables such as education, occupation, size of land holding, family type were significantly correlated with knowledge level of fish farmers at 0.05 percent level of significance. Annual income, mass media exposure, risk bearing capacity, progressiveness and scientific orientation were significantly correlated with knowledge level of fish farmers at 0.01 percent level of significance. Whereas, age, marital status and type of house were non-significant with knowledge level of fish farmers. In the case of relationship between attitude level of fish farmers and independent variables, variables such as education, occupation and size of land holding were significantly correlated with attitude of fish farmers at 0.05 percent level of significance. Annual income, mass media exposure, risk bearing capacity, progressiveness and scientific orientation were significantly correlated with attitude of fish farmers at 0.01 percent level of significance. Whereas, marital status, type of house and family type are non- significant with attitude level of fish farmers and age is negatively correlated at 0.05 percent level of significance. Similar finding is also reported by Kulkarni, Markad, Kunjir, Sutar and Meshre.

Conclusion

It is concluded that of the respondent are middle age, educated up-to junior higher secondary level of education, majority of the respondents were engaged in agriculture only, income is above 1 lakh rupees, majority of the respondents land holdings are above 5 acres, majority of the respondents have 3 years of fish farming experience and have medium level of mass media exposure, medium level of sources of agriculture information. Majority of the respondents had medium level of knowledge towards improved fish farming practices. Majority of the respondents had medium level of adoption towards improved fish farming practices. Out of eleven independent variables, i.e. age, education, occupation, annual income, land holding, farming experience, mass media exposure, sources of agriculture information, risk bearing capacity, scientific orientation and economic motivation were

positively and significantly co-related with the knowledge and adoption towards improved fish farming practices.

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