International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(5): 1055-1059

Received: 14-06-2020
Accepted: 06-08-2020

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Status of pisciculture adoption in Jagatsinghpur district: A dissemination

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DOI: https://doi.org/10.22271/chemi.2020.v8.i5o.10434

Abstract
Pisciculture is a boon to Jagatsinghpur district of Odisha. It is one of the potential producer of fish. This present study focused on to study the extent of adoption in pisciculture of Jagatsingpur farmers. Ex-post-facto approach study was made. The data collected through a pre-tested structured interview schedule with employment of appropriate statistical measures for analysis and interpretation of the data. The major findings of the study were that 60.83% of the fish farmers belonged to middle age group, 49.16% of fish farmers received high school and above education, 90.83% of respondents belonged to marginal and small farmer category, 75.83% fish farmers had more than 10 years of experience in fish farming. The extent of adoption by majority of the fish farmers was medium i.e. 73.33%. Only 5.83% respondents were high adopters which indicated that they were putting into practice all the recommended practices. The study revealed that farm size, house type, pond size, extension contact, information source use and knowledge level had significant and positive relationship with the adoption of various pisciculture technologies.

Keywords: Adoption, pisciculture, correlation, percentage, Jagatsinghpur

Introduction
Odisha is one of the major maritime states of India, offering vast scope for development of inland, brackish water and marine fisheries. The State's 480 km long coastline with 24,000 sq. km area within the continental shelf has ample potential for marine fisheries development. Freshwater resources of the state are estimated to be 6.76 lakh ha comprising 1.25 lakh ha of tanks/ponds, 2 lakh ha of reservoirs, 1.80 lakh ha of lakes, swamps & jheels and 1.71 lakh hectares of rivers and canals. The state's brackish water resources are of the order of 4.18 lakh ha with a breakup of 0.79 lakh ha of Chilika Lake, 2.98 lakh ha of estuaries, 32,587 ha of brackish water area and 8,100 ha of backwaters.

Odisha has achieved a record growth of around 13 per cent in fish production during 2014-15 with total production of 467076 MT against the total production of 413889 MT last year.

The fish farmers of Odisha are faced with low levels of literacy and relatively high levels of debt. This calls for a paradigm shift in the way fisheries is regulated and managed. The challenge, in this context, is to develop a long term strategic plan allowing for the balanced and sustainable management and development of the fishery sector.

Pisciculture is not a new subject for the scientists, researchers, extension functionaries of the line departments but the newness is in its different components and their adoption by the end users. The volume of information being disseminated and the information being used by fish growers, is the matter of concern. Despite the efforts made by various organisations to transfer fish culture technology, it is observed that farmers are operating mostly in subsistence level. In the district of Jagatsinghpur, a large number of individual and community owned ponds exist in each village where pisiculture is undertaken as an allied enterprise along with paddy cultivation.

As the district is bounded by 80 km coastline and has vast inland water resources of 1563.28 ha. in 8 blocks, it has ample scope of development of inland, brackish water fisheries as well as marine fisheries. The Fish Farmers Development Agency (FFDA) and Brackish water Fisheries Development Agency (BFDA) have been working in the district under the Chairmanship of the Collector and District Magistrate, Jagatsinghpur for development of inland and brackish water fisheries aiming at enhancement of fish and shrimp production

respectively. The District Fisheries Officer, Jagatsinghjpur is working as the Chief Executive Officer of both the Agencies. The Office of the Asst. Director of fisheries (Marine) is functioning at Kujanga for enhancement of Marine Fish Production. The Krishi Vigya Kendra (KVK) is situated at Nimakana, Manijanga, which is almost found at centre of the district. It is natural that KVK adjacent villages would adopt pisciculture technologies in an organised manner. Thus the findings of the study would be of vital help in designing the appropriate strategy for diffusion and adoption of improved pisciculture practices. Hence, the study has its own scope and importance for the farming communities of Odisha state.

Materials and Methods

The present research study was formulated on the basis of ex-post- facto approach. During selection of respondent, both purposive and simple random sampling was employed. Jagatsingpur district is selected purposively. Tirtol, Kujanga and Erasama blocks and their panchayats i.e Manijanga, Krushnanandapur form Tirtol; Sailo, Zillanasi from Kujang and Ambiki, Baleipur from Erasama block were selected purposively because of closeness to KVK, opportunity for wide market of produce, more efforts on transfer of technology and availability of abundant production resources. From each panchayat list of farmers having minimum five year practice of pisciculture was prepared with the help of Fishery Extension Officers in the block and the scientists of Krishi Vigyan Kendra. Twenty respondents from each panchayat were identified randomly from the list prepared.

In the present study adoption refers to the extent to which a practice on scientific management of pisciculture was in use by the respondents at the time of interview. A scale consisting of 33 statements concerning different practices/principles of pisciculture was developed in consultation with fisheries scientists and extension officers. Further, those statements were grouped under 6 subheads containing 5 to 6 statement each. The responses of respondents on each statement were obtained in a 3-point continuum scale by mentioning each statement as fully adopted, partially adopted and not adopted.

Sl. No.	Adoption level	Score
i.	Fully adopted	3
ii.	Partially adopted	2
iii.	Not adopted	1

Further, the respondent were grouped into 3 categories basing on mean of total individual scores and standard deviation as checks. The categorization was low, medium and high level.

Adoption gap was computed as the difference between maximum obtainable score and obtained score of a practice. This was expressed in percentage.

Result and Discussion

Adoption of the technology by the fish growers depends greatly on the feasibility, sustainability, stability, compatibility, divisibility, simplicity, visibility and profitability parameters of the recommended technology. In order to assess the extent of adoption, various recommended practices under pond requirement, cultivable fish species, pre-stocking management, pond management, disease management, harvesting and post-harvesting management were taken into consideration and the responses about their adoption were recorded in a 3 point continuum and analysed.

Adoption of pond requirement

Pond is the first and foremost resource needed for practising pisciculture technology. Therefore an attempt was made to find out adoption of various technologies regarding pond requirement and the findings were presented in table 1.

Table 1: Adoption of pond requirement (N=120)

Sl. No	Statements	Fully adopted		Partially adopted		Not adopted		Mean	Rank	Gap %
		f	%	f	%	f	%			
1.	Having pond size of 0.2 to 2 ha.	85	70.83	5	4.17	30	25.00	2.46	IV	18.00
2.	Maintaining depth of water not more than 5 ft.	85	70.83	34	28.33	1	0.83	2.70	II	10.00
3.	Making bottom of pond sloppy for better drainage	90	75.00	27	22.50	3	2.50	2.73	I	9.00
4.	Restricting inflow of water from outside	85	70.83	30	25.00	5	4.17	2.67	III	11.00
5.	Keeping pond in good hygienic condition	39	32.50	69	57.50	12	10.00	2.23	V	25.67

Data from the table 1 revealed that the practice of making bottom of pond sloppy for better drainage was fully adopted by 75% fish growers. Next to this, the practices such as maintaining depth of water not more than 5 ft., restricting inflow of water from outside and maintaining pond size of 0.2 to 2 ha. were fully adopted by 70.83% fish farmers.

An adoption gap of 25.67% in keeping pond in good hygienic condition was found. This may be due to non-availability of sufficient pond and lack of technical know-how about pond hygiene. Sufficient training should be provided regarding pond hygiene to decrease the adoption gap.

Adoption of cultivable fish species

Success of fish culture often depends upon the choice of fish species. Suitable species of fish must be adopted for getting better yield as well as profit. Therefore the adoption of different cultivable fish species by the fish growers were analysed and presented in table 2.

Table 2: Adoption of cultivable fish species (N=120)

Sl. No	Statements	Fully adopted		Partially adopted		Not adopted		Mean	Rank	Gap %
		F	%	f	%	f	%			
1.	Using Catla-Rohu-Mrigal at 4:3:3 proportion	85	70.83	35	29.17	0	0.00	2.71	I	9.67
2.	Practising composite fish culture	32	26.67	87	72.50	1	0.83	2.26	II	24.67
3.	Cultivating Grass carp and Silver carp with Common carp	1	0.83	77	64.17	42	35.00	2.16	III	28.00
4.	Cultivating prawn with fish	2	1.67	88	73.33	30	25.00	1.77	IV	41.00
5.	Pearl cultivation with fish	1	0.83	58	48.33	61	50.83	1.50	V	50.00
6.	Keeping air breathing fish species with carps	1	0.83	37	30.83	82	68.33	1.33	VI	55.67

Table 2 indicated that 70.83% of the fish growers had fully adopted culture of catla-rohu-mrigal at 4:3:3 proportion. Next to this, 26.67% fish farmers had fully adopted composite fish culture. The percentage of non-adopters in cultivating prawn with fish, pearl cultivation with fish and keeping air breathing fish species with carps were 25.00, 50.83 and 68.33 respectively.

The adoption gap of air breathing fish species with carps and pearl cultivation with fish were 55.67% and 50.00% respectively. This was due to complexity of the technology and lack of acquaintance of the technology.

Adoption of pre-stocking management

The pond environment provides optimum condition for growth of fish. Hence the pond should be free from predators, aquatic weeds and weed fish. The fingerlings are only then safely released into the pond. An attempt was made to analyse adoption of different practices of pre-stocking management. The findings were presented in table 3.

Table 3: Adoption of pre-stocking management (N=120)

Sl. No	Statements	Fully adopted		Partially adopted		Not adopted		Mean	Rank	Gap %
		f	%	f	%	F	%			
1.	Using Mahua oil cake to kill unwanted species	35	29.17	79	65.83	6	5.00	2.24	V	25.33
2.	Using lime @ 2.5 qt/ha per annum.	77	64.17	39	32.50	4	3.33	2.61	III	13.00
3.	Using cow-dung as organic manure	81	67.50	31	25.83	8	6.67	2.61	III	13.00
4.	Growing Dhanicha for manures	48	40.00	54	45.00	18	15.00	2.25	IV	25.00
5.	Eradicating predators and unwanted species	88	73.33	24	20.00	8	6.67	2.67	II	11.00
6.	Releasing fingerlings at proper time	86	71.67	30	25.00	4	3.33	2.68	I	10.67

The data from the table 3 revealed that the practice of releasing fingerlings at proper time and the practice of eradicating predators and unwanted fish species was fully adopted by 73.33% and 71.67% of fish growers respectively. This might be due to possession of sound knowledge about timing of release of fingerlings and their protection. The adoption gap of using mahua oil cake to kill unwanted species and growing dhanicha for manures were 25.33% and 25.00% respectively. Knowledge and skill development about use of these locally available material can decrease the adoption gap.

Adoption of pond management

Pond management includes pond amelioration, fertilizer application, mannuring, application of lime, checking fish movements etc. It is of due importance since it is the dwelling place for fishes and have direct impact on growth and yield of fish. So, adoption of some pond management practises were studied in the table 4.

Table 4: Adoption of pond management (N=120)

Sl. No	Statements	Fully adopted		Partially adopted		Not adopted		Mean	Rank	Gap %
		f	%	F	%	f	%			
1.	Maintaining stocking density of 2000 fingerlings/ac of pond.	56	46.67	57	47.50	7	5.83	2.40	V	20.00
2.	Applying cow dung and fertilizers	84	70.00	24	20.00	12	10.00	2.60	III	13.33
3.	Intermediary netting to clear water and regulate fish movement	84	70.00	27	22.50	9	7.50	2.62	I	12.67
4.	Applying lime at proper time and dose	83	69.17	27	22.50	10	8.33	2.61	II	13.00
5.	Giving supplementary feeds as recommended	76	63.33	40	33.33	4	3.33	2.60	III	13.33
6.	Application of recommended fertilizers	77	64.17	36	30.00	7	5.83	2.58	IV	14.00

It was observed from the table 4 that most of the fish farmers were adopting all the pond management practices such as intermediary netting, lime application, supplementary feeding to fishes, application of recommended fertilizers and maintenance of stocking density of 2000/acre of pond. An adoption gap of 20% was observed in maintaining stocking density of 2000 fingerlings/ac of pond. This may be due to lack of knowledge about stocking of fingerlings and unavailability of suitable pond conditions.

Adoption of disease management: Prevention and management of fish diseases is one of the most important part of pisciculture. Proper care of disease attack, control measures in disease attack, pond hygiene are the essential practices to consider. Hence, an attempt was made to discover adoption of disease management practices which was analysed and presented in table 5.

Table 5: Adoption of disease management (N=120)

Sl. No	Statements	Fully adopted		Partially adopted		Not adopted		Mean	Rank	Gap %
		f	%	f	%	F	%			
1.	Application of recommended dose of lime	61	50.83	45	37.50	14	11.67	2.39	IV	20.33
2.	Proper care for disease attack	74	61.67	31	25.83	15	12.50	2.49	III	17.00
3.	Preventing cattle and human bathing	5	4.17	97	80.83	18	15.00	1.89	V	37.00
4.	Keeping pond always clean and in hygienic condition	76	63.33	36	30.00	8	6.67	2.56	II	14.67
5.	Applying proper control measures in disease attack	80	66.67	32	26.67	8	6.67	2.60	I	13.33

A look in to the table 5 indicated that 66.67% of fish growers were fully adopting the practice of applying proper control measures in disease attack. The practice of keeping pond always clean and in hygienic condition and proper care for disease attack was fully adopted by 63.33% and 61.67% respectively.

However, only 4.17% of fish growers were successful in fully preventing cattle and human bathing in their ponds indicating 37% adoption gap. This happened solely due to social problems. The analysis of adoption gap suggest that the fish growers need comprehensive trainings on application of lime and care of disease attack.

Adoption of harvesting and Post-harvesting management

Harvesting is equally important with post-harvesting practices. Harvesting of fishes at proper stage using suitable methods and disposal of fishes are some of the critical factors which are discussed below in table 4. 3.6.

Table 6: Adoption of harvesting and post-harvesting management (N=120)

Sl. No	Statements	Fully adopted		Partially adopted		Not adopted		Mean	Rank	Gap %
		F	%	f	%	f	%			
1.	Harvesting of fish by netting only	60	50.00	60	50.00	0	0.00	2.50	IV	16.67
2.	Harvesting at proper stage	65	54.17	55	45.83	0	0.00	2.54	III	15.33
3.	Freezing the fish after harvest if required	1	0.83	83	69.17	36	30.00	1.70	V	43.33
4.	Not harvest the fish by completely draining the water	96	80.00	23	19.17	1	0.83	2.79	II	7.00
5.	Disposing fish immediately after harvest	114	95.00	6	5.00	0	0.00	2.95	I	1.67

Data from the table 6 discloses that 95% of fish growers were disposing fish immediately after harvest. 80% of fish growers were not draining the water from the pond during harvesting of fish. The two practices had high adoption rate because of sound knowledge about the technology. 54.17% and 50% of fish growers had fully adopted the practice of harvesting at proper stage and harvesting of fish by netting only. 43.33% gap in adoption of freezing the fish was seen. This was due to easy disposal of harvested fish, proper freezing equipment and high cost of the technology.

Further, the respondents were categorized basing on their adoption behaviour relating to all the above mentioned recommended practices which was presented in table 7.

Table 7: Categorisation of respondents basing on adoption level (N=120)

SI. No.	Category	Adoption (Score)	Frequency	Percentage
1.	High	90 and above	7	5.83
2.	Medium	67-90	91	73.33
3.	Low	Up to 67	22	20.83

(Calculated on the basis of mean of individual score 78.85 & S.D $\pm$ 11.15)

It is observed from the table 7 that adoption behaviour of farmers followed the same trend as knowledge level. About 73.33% respondents were found to be partial adopters. This indicated that they were adopting different recommended practices of composite fish culture to varying degrees. Only 5.83% respondents were high adopters which indicated that they were putting into practice all the recommended practices. 20.83% of respondents were not following the recommended practices which indicated that this group of farmers were practicing traditional fish farming.

Table 8: Correlation of independent variables with adoption level of respondents

Sl. No.	Variables	r- value	Remarks
1	Age(X_1)	-.058	NS
2	Caste(X_2)	.193	*
3	Education(X_3)	.058	NS
4	Farm size(X_4)	.261	**
5	Annual income(X_5)	.215	*
6	Farming experience(X_6)	-.153	NS
7	Family size(X_7)	-.181	*
8	House type(X_8)	.388	**
9	Type of pond(X_9)	-.023	NS
10	Ownership of pond(X_{10})	.143	NS
11	Availability irrigation facility(X_{11})	.088	NS
12	Pond size(X_{12})	.399	**
13	Extension contact(X_{13})	.371	**
14	Information source use(X_{14})	.241	**
15	Knowledge level (X_{15})	.532	**

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

NS. Correlation is not significant

The data reported in the table 8 revealed that farm size, house type, pond size, extension contact, information source use and knowledge level had significant and positive relationship with the adoption of various pisciculture technologies. Family size had negative relationship with adoption whereas age and farming experience were not related. General caste people were more educated and exposed to the new technology than OBC, SC, ST people.

Conclusion

The study as a whole indicated that fish farming is perceived as one of profitable and feasible enterprise in the study area. Adoption practices are satisfactory. They also need regular visit of the technical personnel, exposure for developing confidence, training and demonstrations for skill competency, literatures for reference and other advisory services particularly for manuring, feeding and disease management.

It is therefore concluded that these aspects may be taken care of by the policy makers, scientist, extension agencies working in the area, so that the fish farmers will adopt recommended practices and harvest desirable quantity of fish not only to increase their standard of living but also make the area as well as the state self-sufficient in fish production, to fulfil at least internal requirements.

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