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Note

Adoption of Better Management Practices (BMPs) and constraints in shrimp farming in selected districts of Odisha

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ABSTRACT

The present study was undertaken in Balasore and Puri districts of Odisha State to know the adoption level of Better Management Practices (BMPs) by shrimp farmers. Data from 60 farmers each from Balasore and Puri districts were collected using random sampling method, About 63 and 46% of the BMPs of shrimp farming were adopted by the farmers of Balasore and Puri districts respectively. Majority of the respondents belonged to medium and high level category in adoption of BMPs in both the districts. Overall, the farmers of Puri District were adopting less BMPs as compared to farmers of Balasore District. The study also identified different constraints faced by farmers in adopting the BMPs. The present study suggested ways and means to enhance the adoption of BMPs by shrimp farmers.

Keywords: Adoption index, BMPs, Constraint, Extent of adoption, Socio-economic profile

Shrimp is one of the most popular seafood in the world. Shrimp resources are highly diversified and contribute significantly to the growth of aquaculture. As per FAO (2011), the total world production of shrimps, comprising both captured and cultured was around 6 million t. The total production of cultured shrimp was 3.3 million t in terms of quantity and 13.4 billion USD in terms of value and the contribution of captured shrimp was 3.12 million t in the year 2010 (FAO, 2011). China ranked first in shrimp aquaculture with 40% of total cultured shrimp production followed by Thailand (15%), Vietnam (12%) and Indonesia (10%). India stood at fifth position with a contribution of about 3% (FAO, 2011). Globally shrimp farming is practiced in more than 50 countries and the sector has grown at the rate of 19.9% per year since 1970 (FAO, 2011). Asian countries contribute around 75% of the world production of farmed shrimp, China being the major contributor with production of 8.99 lakh t followed by Thailand (5.48 lakh t), Vietnam (5.38 lakh t), Indonesia (3.57 lakh t), and India (1.36 lakh t) in 2010 (FAO, 2011). Thailand ranked first in terms of export, with a market share of more than 30%, followed by China, Indonesia, and India, accounting about 10% each. European Union (EU) is the largest market of shrimp with a share of 26.78% with a value of 765 million USD followed by South-east Asia (469.36 million USD), China (440.10 million USD) and Japan (373 million USD).

India is the second largest among the aquaculture producing countries in the world (Ayyappan, 2010) The value of output from fisheries sector is ₹67,913 crores (USD 9 billion) and the total seafood export from India is about 8.13 lakh t by quantity and ₹12,901.47 crores in terms of value in 2011 (MPEDA, 2012). Fisheries contribute 14% of total agricultural exports. Shrimp continued to be the single largest item of fisheries export in terms of value. The average farmed shrimp production from India was close to 1.2 lakh t per year with a value of ₹5718.13crores (USD 1261.81 million) with 19% share to total marine export in terms of quantity and 44.32% in terms of value (MPEDA, 2011). India occupies fifth position in cultured shrimp production with 1.36 lakh t in 2010 (MPEDA, 2011). Fisheries contributes 1% of total GDP and 4.56% of agricultural GDP in Indian economy (Ayyappan, 2010)

Shrimp farming is an important economic activity in India, however facing lot of challenges like legal, environmental, social as well as disease issues. Disease is a major threat to aquaculture production and profitability (Subasinghe, 2005). It is essential to adopt Better Management Practices (BMPs) from the stage of pond preparation to post-harvest to achieve sustainability in shrimp farming. Better Management Practices (BMPs) were jointly developed by Food and Agriculture Organization (FAO) of the United Nations, Network of

Aquaculture Centers in Asia Pacific (NACA), World Bank, World Wide Fund for Nature (WWF) and the United Nations Environment Program (UNEP).

The present study was undertaken to assess the adoption level of Better Management Practices (BMPs) by shrimp farmers in Balasore and Puri districts of Odisha state during the period 2012-13. A total of four blocks, *i. e*., two each from Balasore and Puri districts were selected for the study considering the preponderance of shrimp farmers. A total of 12 villages were selected (three villages from each block) in consultation with the local shrimp feed technicians and officials of the State Department of Fisheries in each block. Thus a total sample of 120 respondents (10 from each village) was selected for the study.

In the present study, adoption referred to the practice of some or all the recommended BMPs in shrimp farming by the respondents. The methodology followed by Singha (1996) was adopted in this study. For full adoption, a score of 2 and for partial adoption, a score of 1 was given and for non-adoption, the score given was 0. The selected farmers were interviewed with structured interview schedules. Statistical tools like, percentage, mean and

$$\text{Extent of adoption} = \frac{\text{No. of respondents who had adopted the practices}}{\text{Total no. of respondents}} \times 100$$

$$\text{Adoption index} = \frac{\text{Total score obtained by the respondents for each practice}}{\text{Maximum score that could be obtained}} \times 100$$

standard deviation were used to analyse the data.

The total number BMP practices selected for the study was 35 which were recommended by the Coastal Aquaculture Authority (CAA)/Food and Agriculture Organisation (FAO) (CAA, 2010). The total score for a respondent was obtained by summing up the score obtained on each individual practice. The maximum score that one could get was 70 and minimum was 0. The respondents were categorised into three based on mean and standard deviation .

From the study, it was found that in Balasore District, majority (56.67%) of the respondents were middle aged, followed by young (33.33%) and old (10%) age groups (Table 1). In Puri District it was observed that majority (51.67%) of the respondents were middle aged followed by old (30%) and young (18.33%) age groups. With respect to educational status, it was observed that in Balasore District, more number of respondents had high school and middle school level of education (23.33%) followed by primary (18.33%) and higher secondary (13.33%), whereas graduates and postgraduates were only 13.33% and 3.33% respectively, and only 5% were illiterates. In Puri District it was observed that more number of respondents had high school (30%) and middle school level of education (21.67%) followed by higher secondary (16.67%) and primary (15%), whereas graduates and postgraduates were only 8.33% and 1.67% respectively, and only 6.67% were illiterates. In Balasore District majority of the farmers had joint family (68%) while 31.66% of the farmers had nuclear family. Majority of farmers in Balasore District (68.33%) had family size of more than 5 members and 31.66% of them had family size of less than 5 members. In Puri District, the family type was same as in Balasore District but, with respect to family size, 33.33% of family had less than 5 members

Majority (73.73%) of the farmers in Balasore District (Table 1) were trained, which was more compared to Puri District (58.33%). In Balasore District about 51.67% of farmers had 5 years of experience and 35% had 5-10 years experience. In Puri District, about 65% of the farmers had 5 years of experience and 26.67% had 5-10 years of experience. The economic and social progress of farm households largely depends on the size of the operational holding. Majority (43%) of the farmers had 1-2 ha, and 40% had 1 ha of land. Ten percent of farmers had 2-3 ha and 6.67% had more than 3 ha. In Balasore District. (Table 1) majority (81.67%) had own ponds, 1.67% had leased ponds and 16.67% had both own as well as leased ponds. In Puri, majority (86.67%) of the respndetns had own ponds while 13.33% had both own and leased ponds.

From Table 2 and 3 it was observed that majority (63.33%) of the respondents had medium level of adoption followed by high (20%) and low (16.67%) levels of adoption. The average extent of adoption in Balasore District was 63.47%. In Puri District, the average extent of adoption was 46.22%. Majority (70%) of the respondents had medium level of adoption followed by high (15%) and low (15%) levels of adoption. The farmers of Puri District were following traditional or extensive type of farming, the reason may be that most of farmers had less knowledge about BMPs as well as improved farming practices.

Balasore District shrimp farmers had maximum adoption index (100) on the practices like complete removal of organic wastes, seed releasing time, maintenance of bloom, use of feed check tray, adjustment of feed during lunar cycle or moulting stage and use of probiotics (Table 4). Higher adoption index was also observed on practices like number of days of post-larvae (91.67), crab fencing (90), liming (80), maintaining 1 m depth of

Table 1. Social profile of shrimp farmers

Particulars	Category	Balasore District (%), n = 60	Puri District (%), n = 60
Age (in years)	Up to 30	33.33	30.00
	31-50	56.67	51.67
	Above 51	10.00	18.33
Education	Illiterate	5.00	6.67
	Primary	18.33	15.00
	Middle	23.33	21.67
	High school	23.33	30.00
	Higher secondary	13.33	16.67
	Graduate	13.33	8.33
	Postgraduate	3.33	1.67
Family type	Nuclear	31.67	31.67
	Joint	68.33	68.33
Family size	<5 members	31.67	33.33
	>5 members	68.33	66.67
Land holdings (ha)	Up to 1	40.00	60.00
	1-2	43.33	28.33
	2-3	10.00	11.67
	>3	6.67	0
Pond ownership	Owned	81.67	86.67
	Leased	1.67	0
	Owned + Leased	16.67	13.33
Training	Trained	73.33	58.33
	Untrained	26.67	41.67
Farming experience (in years)	Up to 5 years	51.67	65.00
	5-10	35.00	26.67
	10-15	5.00	3.33
	>15	8.33	5.00

Table 2. Adoption level of shrimp farmers with respect to BMPs in Balasore District (n = 60)

Category	Frequency	Percentage
Low adopters (<58)	10	16.67
Medium adopters (58-69)	38	63.33
High adopters (>69)	12	20.00

Table 3. Adoption level of shrimp farmers with respect to BMPs in Puri District (n = 60)

Category	Frequency	Percentage
Low adopters (< 41%)	9	15
Medium adopters (41%-52%)	42	70
High adopters (>52%)	9	15

pond (82.5), stocking density (72.5), and formation of bloom in colour range of brownish to yellowish before stocking (70) and bleaching of water (68.33). The adoption index was low for practices like fertilization (40), testing of soil pH (38.33), exchange of water (21.67), use of reservoir pond (18.33) and effluent treatment plant, ETP (0).

But in Puri District (Table 4), shrimp farmers had maximum adoption index (100) on the practices like exchange of water, maintenance of bloom, use of aerator and depth of water exchange. Higher adoption index was observed in case of practices like crab fencing (90.67), stocking rate (85), maintaining 1 m depth of pond (61.67), seed releasing time (66.67) and use of probiotics (66.67). The adoption

Table 4. BMPs adoption indices of the shrimp farmers

BMP practices	Adoption index	
	Balasore District	Puri District
Complete removal of organic waste	100.0	65.83
Seed releasing time	100.0	66.67
Maintenance of bloom	100.0	100
Using feed check tray	100.0	40
Adjustment of feed during lunar cycle or moulting and feeding frequency	100.0	100
Use of probiotics	100.0	66.67
No. of days of post-larvae	91.67	0
Body length of PL	91.67	0
Crab fencing	90.00	91.67
Depth of pond	82.50	61.67
Feeding shrimp 6 h prior to harvesting	81.67	65
Liming	80.00	65
Bird fencing	80.00	78.33
Stocking density of PL while transporting	77.50	0
Spacing adopted	75.00	60.83
Stocking rate	72.50	85
Formation of bloom in colour range of brownish to yellowish before stocking	70.00	41.67
Bleaching of water	68.33	50
Checking of water quality parameter	65.83	20
Filling of water using 2 layers of fine nets	63.33	70.83
PCR testing of seed	63.33	0
Purchase of shrimp seed from certified hatchery	60.00	0
Acclimatisation of seed	59.17	50
Regular pond bottom sampling	57.50	31.67
Wash shrimp and dip in ice	50.00	50
Fertilization	40.00	30
Soil pH testing	38.33	41.67
Depth of water exchange	35.00	100
Release water after bleaching	31.67	35
Exchange of water	21.67	100
Use of sanitiser	20.00	35
Reservoir ponds	18.33	61.67
Biodegradable piscicides	0	0
Using boat to feed	0	0
Effluent treatment plant (ETP)	0	0

Table 5. Constraints in adoption of BMPs

Particulars	Balasore District (%)	Rank	Particulars	Puri District (%)	Rank
Price fluctuation	81.66	1	Price fluctuation	80	1
High cost of input materials	66.66	2	Lack of electricity	76.66	2
Lack of credit facilities	65	3	High cost of input materials	71.66	3
Lack of technology guidance	63.33	4	Lack of credit facilities	70	4
Labour scarcity	61.66	5	Lack of technology guidance	65	5
Lack of electricity	60	6	Poor cooperation	60	6
Poor cooperation	58.33	7	Disease occurrence	56.66	7
Natural disaster	38.33	8	Poor quality seed	28.33	8
Poor quality seed	35	9	Poor water quality	26.66	9
Disease occurrence	31.66	10	Weed infection	25	10
Transportation	23.33	11	Transportation	21.66	11
Weed infection	20	12	Natural disaster	20	12
Poor water quality	16.66	13	Labour scarcity	20	13
Poaching	13.33	14	Poaching	15	14

index was low on practices like fertilization (30), testing of soil pH (41.67) and checking water quality parameters (20). Practices like purchase of shrimp seed from certified hatchery, no. of days of post-larvae, body length of PL, PCR testing of seed, stocking density of PL while transporting, using boat to feed, and use of ETP were not adopted by the farmers, Overall, it was found that the farmers of Puri District were adopting less BMPs as compared to farmers of Balasore District.

In both the districts, selling price of the produce was low and increasing price of input materials was indicated as the major constraint by the shrimp farmers in adoption of BMPs (Table 5). Farmers are unwilling to adopt more scientific practices as the market price of shrimps is fluctuating regularly. Lack of credit facilities is also a major issue as scientific shrimp farming is more expensive these days. Lack of guidance on the technologies was also raised as an important constraint as farmers are not much aware of new scientific techniques of shrimp farming. Other constraints indicated by the respondents were, labour scarcity, lack of electricity and poor seed quality. Based on thorough examination of the above findings, it is felt that suitable policy guidelines need to be drawn for improving the adoption level of BMPs by shrimp farmers. Direct marketing and good market price of the produce should be encouraged without involvement of middle men so that the farmers get better income. Implementation of strict regulations to adopt BMPs from Costal Aquaculture Authority (CAA) is very much essential. Development of extension strategies plays an important role towards harmonisation of BMP messages and therefore linkages between BFFDA, Department. of Fisheries and the shrimp farmers need to be strengthened.

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