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Socio-economic Status of Fishers and Fish Production Trends from Cage Culture in Chandil Reservoir, Jharkhand

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ABSTRACT

Socio-economic status of fishers involved in fish cage culture in Chandil reservoir, Jharkhand along with fish production trends and benefit cost (BC) ratio was analysed. Information was collected from 200 fisher members of 5 societies about age, education, fisheries experience, extension communication, house type/ ownership, drinking water, electricity, transportation, land ownership, family income and expenditure using interview schedule. Reliability of schedule was established by 'test retest' method. Information was collected about cage culture, fish production trends, cage cost, operational cost, total cost, and income. BC ratio and bivariate correlation were computed. It was found that Department of Fisheries leases reservoir, does fish stocking under different schemes of National Fisheries Development Board. Fisher members were involved from stocking to marketing. BC ratio was found to be 1.46 with income and experience having high correlation.

Key Words: Cage culture, Fish, Production, Reservoir, Socio-economic status, Trend.

INTRODUCTION

Cage culture is looked upon as an opportunity to utilize existing reservoirs with great production potential to enhance production from inland open waters (Tacon and Halwart, 2007; Karnatak and Kumar, 2014). Mbowa *et al* (2017) also reported that cage culture is a more productive system in comparison to capture fishery and to increase fish production. Gupta and Haque (2011) observed that cage farming played a considerable role in the uplifting of the socio-economic conditions of tribal households. Pandit *et al* (2021) stated that cage fish farming in Indian reservoirs has the potential to enhance reservoir production.

National Fisheries Development Board (NFDB), has supported several initiatives on cage culture and 3117 inland cages have been installed across India of which 2553 are in reservoirs. (NFDB, 2018). Cage culture is now being scaled up in reservoirs in Jharkhand, Chhattisgarh, Madhya Pradesh and Maharashtra states (Das and Sharma, 2015). The success of cage farming in Jharkhand and Chhattisgarh states have proved the potential of cage culture in India. Hassan *et al* (2017) reported that Jharkhand is the premier state of India which has successfully introduced cage culture in reservoirs and now leads in freshwater cage farming. Cage culture in reservoirs has emerged as a new employment opportunity for people in Jharkhand (Kumari *et al,* 2019). Kumar (2018) stated that cage culture could be a feasible platform for inclusion of displaced tribal people and for enhancing state fish production. In this context, a study was done in Chandil reservoir, Jharkhand with an objective to analyse the socio-economic conditions of fishers involved in cage culture, marketing of fishes, trends of fish production from cages in the last 10 years and its economics.

MATERIALS AND MEHODS

Locale of the study was Chandil reservoir spreaded over 18,000 ha area in Saraikela-Kharsawan district, Jharkhand. Till 2020-21 a total of 1070 cages were installed in Chandil reservoir

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Table 1. Sample information.

Sr. No.	Name of fisheries cooperative society	Total number of members	Members selected for study	Percentage of members selected
1.	Chandil Bundh Visthapit Matsyjiwi Swawlambi Sahkari Samiti (CBVMSSS)	275	137	49.82
2.	Lawa Gram Matsyajivi Sahyog Samiti (LGMSS)	28	14	50.00
3.	Swarnarekha Bandh Visthapit Matsyajivi Sahkari Samiti Ltd. Chandil (SBVMSS)	36	18	50.00
4.	Visthapit Matsyajivi Sahyog Samiti Ltd. Rasuniya (VMSS)	50	25	50.00
5.	Visthapit Matsyajivi Swawlambi Sahkari Samiti Ltd. Bandveer (VMSSS)	12	6	50.00
Total		401	200	49.87

which is the largest reservoir of the state. To achieve the objectives of the study, information was collected by interviews with 200 fishers and focused group discussions with 2 matsya mitra, and 3 officials of Department of Fisheries (DoF). Secondary sources included Annual Report of DoF, information available on DoF website. There are 5 fisheries cooperative societies in Chandil reservoir from each fisheries cooperative society about 50 per cent of the fisher members were randomly selected which was 200 fishers out of 401 (49.87 %) (Table 1).

Information was collected using an interview schedule to assess socio-economic conditions of fisher members and included information about age, educational qualification, fisheries experience, extension communication, house type, house ownership, drinking water facility, electricity and sanitary facilities at home, transportation facility, area of land ownership, annual family income and expenditure. Other than this, additional information about cage culture, marketing of fishes, trends of fish production from cages in the last 10 years and economics of cages were also recorded. Reliability of the interview schedule was tested by the 'test-retest' method. Reliability coefficient was found to be acceptable with a value of 0.75. To calculate the economics of cages information on variables like fixed cost and operational cost were collected and total cost, total income, benefit and benefit cost ratio were calculated. Bivariate correlation was calculated between income and years of fisheries experience of fishers.

RESULTS AND DISCUSSION

It was found that cage culture activities in Chandil reservoir started during the year 2011. Till 2021 a total of 1,070 cages had been installed in the reservoir. It was found that *Pangasianodon hypophthalmus* was cultured in these cages. NFDB provided funding support through DoF, Jharkhand by providing inputs at subsidized rates. It provided 50 per cent subsidy for cage fabrication and inputs. Members of the cooperative society were involved in all the activities i.e., stocking, feeding, maintenance of cages, harvesting and marketing of fishes. In 2011, fish culture was done in 70 cages and now with a total of 1,070 cages the production has increased (Figure 1).

It was clear (fig 1) that although the number of cages have increased, average production per cage has not shown an increasing trend and the reason was seed constraint. Economics of cages was calculated along with Benefit Cost (BC) ratio (Table 2).

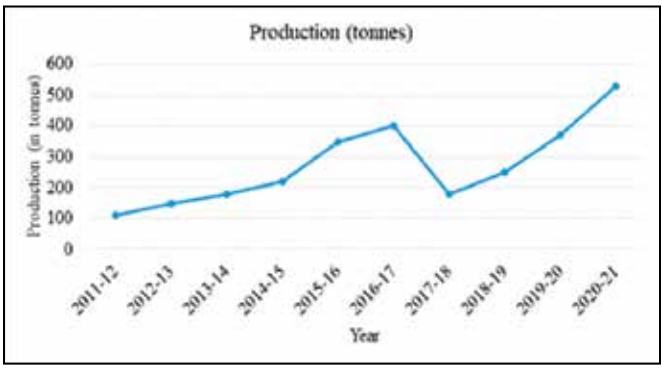

Figure 1: Trends of fish production in Chandil reservoir

From Table 2, it was evident that from a battery having 4 cages there was a net benefit of Rs. 3.41 lakh in a year. The BC ratio was found to be 1.46 which indicates the cage culture project was viable and profitable. This was due to good working of fisheries cooperatives as reported by Kumari *et al* (2021). Das (2012), Aswathy and Joshep (2019), De Silva and Phillips (2007) have also reported that cage farming practices were profitable.

Socio-economic status

Age

It was found that the majority (79.5 %) of fishers belong to the middle age group followed by young 12.5 per cent and old age 8 per cent. Similar findings were reported by Gautam *et al* (2020) in a study done in Rihand reservoir in Uttar Pradesh.

Educational qualification

Majority of the fishers were educated up to secondary level followed by primary, higher secondary and graduation. It was found that before adoption of cage culture very few (18.5 %) were involved in fisheries activities and had experience in fisheries. After adoption of cage culture all have gained experience in fisheries.

Extension communication

It was reported by the fishers that they mostly use mobile phones for media exposure whereas few had television (30 %) and subscribed to newspapers (10 %). As regards to extension contacts they had

Table 2. Economics of GI cages (4 chamber) in Chandil reservoir, Jharkhand

Parameter	Rate	Quantity	Amount
Cost of cage			300000
Fixed cost			
Interest	12 per cent		36000
Depreciation			50000
Total			86000
Operational cost			
Seed	Rs. 1.5/piece	15000	22500
Feed	Rs. 32/Kg	28 t	576000
Labour cost			48000
Miscellaneous			6000
Total operational cost			652500
Total cost			738500
Survival	80 percent	12000	
Production	@0.9 Kg	10800 kg	
Total income (Total benefit)	@ Rs.100/kg	10800 kg	1080000
Net Benefit			341500
BC ratio			1.46

Table 3. Annual income of fishers in Chandil reservoir, Jharkhand.

Income in Rs.	Frequency	Percentage
Low (Rs. 2.00 – 2.37 lakh)	35	17.5
Middle (Rs. 2.37 – 4.64 lakh)	116	58.0
High (Rs. 4.64 – 5.87 lakh)	49	24.5

good contacts with the cooperative society and the officials of the DoF.

House type and ownership pattern

It was found that the fishers live in rural areas had their own house. Majority (61.5 %) had pucca house, followed by 26 per cent who had semi pucca house and only 12.5 per cent of fisher members had kuccha house. Majority of them have pucca house because of the state government scheme "Ved Vyas Awas Yojana" under which pucca houses were constructed for fishers' family.

Drinking water, Electricity and Sanitary facility at home

It was found that 70 per cent of fisher members were having drinking water facilities at home and 30 per cent of the fishers were bringing water from the village hand pump which was situated nearby. All fishers had electricity facility and toilet facility at home. For medical facilities, there is a Primary Health Centre (PHC), government Hospital and Private hospital. The study revealed that the majority (70.5%) of the fisher members have cycle as a means of transportation, 47.5 per cent have motor cycle and 14 per cent fisher members reported that they use public transportation.

Area of land and Income

Most fishers (88 %) had less than 1 ha of land and only 1 per cent had more than 10 ha of land. Average annual income Rs. 3.51 lakh. Majority (58 %) belong to middle income group (Rs. 2.37 to 4.64 lakh), followed by 24.5 per cent who had high income (Rs. 4.64 to 5.87 lakh) and 17.5 per cent fisher who had low income (Rs. 2 to 2.37 lakh) (Table 3). National average annual income is Rs. 1,26,406 as per National Statistical Office, Ministry of Statistics & Programme Implementation Government of India, 2019-20. It was clear from the study that fishers' income is more than national average income and the annual average income of Jharkhand (Rs. 83,592) as per the Department of Planning cum Finance, Government of Jharkhand, 2019-20. Annual income of fishers of Chandil reservoir was found to be higher than national and state average. Radhakrishnan *et al* (2019) also reported that cage culture is a useful method to enhance fish production.

Bivariate correlation computation revealed that income and years of fisheries experience was positively correlated at 1 per cent level of significance with r = 0.85 leading to a decision that higher the years of experience, higher will be the income. Other studies by Gebremedhin *et al* (2013) and Putri and Wulandari (2020) have also reported this.

Annual expenditure

The study revealed that most (54.5 %) of the cooperative members had annual expenditure in the range of Rs. 1.93 – 3.95 lakh, 26.5 percent had Rs. 1.55 – 1.93 lakh and 19 percent had Rs. 3.95 – 5.10 lakh (Table 4). Average annual expenses were found to be Rs. 2.94 lakh.

Table 4. Annual expenditure of fishers in Chandil reservoir, Jharkhand.

Expenditure in Rs.	Frequency	Percentage
Rs. 1.55 – 1.93 lakh	53	26.5
Rs. 1.93 – 3.95 lakh	109	54.5
Rs. 3.95 – 5.10 lakh	38	19.0

CONCLUSION

It can be concluded form the study that cage culture was viable as BC ratio was 1.46. Average annual income of fishers was Rs. 3.51 lakh which is higher than that of national and state. With reference to the basic facilities like drinking water and electricity facilities at home, transportation facilities and pucca house are available to majority of fishers thus it can be concluded that cage culture has provided the fishers with a sustainable livelihood opportunity.

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Soil Test-Based Fertilizer Application Enhanced Yield and Economics of Cauliflower in the Soils of North Western Himalayas

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ABSTRACT

The experiments were conducted during 2018 and 2019 in the five villages of Kullu district of Himachal Pradesh to study the impact of soil test based fertilizer application on yield, economics and soil properties in the cauliflower crop. Four treatments were T1: Farmer's practice (FP) 12:32:16 (NPK) 200 kg/ ha and Urea 150 kg/ha, T2: FYM @ 20 t/ha + Recommended dose of 100% NPK @ 125:75:70 kg/ ha and T3: Soil test based fertilizer application and T4: 50 % Recommended Dose + Water soluble fertilizer. The data recorded indicated that significant increase in the yield with the percent increase of 65.90 , 36.12 , 61.09 , 54.50 and 40.61 per cent over the treatment T_1 at all the five locations (I, II, III, IV and V) where soil test based fertilizers were applied. Higher additional net returns and incremental benefit cost ratio (IBCR) were also recorded in the soil test based fertilizer application in the treatment T_3 (Location I- Rs. 70,060/- and 4.41, II- Rs. 56,125/- and 3.54, III- Rs. 97,495/- and 6.14, IV- Rs. 92,065/- and 5.80 and V- Rs. 69,078/- and 4.35) over the farmer's practice. The pH and organic carbon were recorded no significant change during the years of study whereas N, P and K changed significantly due to the application of NPK fertilizers on the soil test basis.

Key Words: Cauliflower, Fertilizer, Soil Testing, Target, Yield.

INTRODUCTION

Cauliflower is a heavy feeder of mineral elements which removes large amount of macronutrients from the soil. More fertilizer application has been recommended for getting good yields of cauliflower by different workers in India. Based on the chemical soil testing there are several methods that have been used for fertilizer recommendation to achieve maximum yield per unit of the fertilizer used. Out of these methods the target yield approach has been found to be beneficial which recommends balanced fertilization considering available nutrients status in the soil and the crop needs (Singh *et al* 2016). However, application of N, P and K fertilizer on soil test target yield based may meet the productivity but it has negative impact on soil health, hence, integrated nutrient management *i.e.,* combination of inorganic and organics helps to enhance the crop productivity while maintaining the soil health (Sharma *et al,* 2015). Kaur and Sharma (2017) reported that the profitable combination of rice-wheat crops has led to higher doses of inputs like chemical fertilizers and pesticides. Excessive use of these chemicals, mechanical operations, lesser use of farm compost as well as non-cycling of crop residues in the soil has created deficiencies of nutrients in the soil. Likewise, Singh *et al* (2016) reported that the organic carbon and available phosphorus exhibited a positive correlation with cropping intensity due to application of higher inorganic fertilizers and incorporation of plant biomass as compared to paddywheat cropping sequence. On the other hand, pH, EC and available potassium showed a decreasing trend with the increased crop intensity from paddy-wheat to paddy-potato/vegetable-summer crop.

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