EFFECTS AND CONSEQUENCES OF SMALL-SCALE CAGE CULTURE TECHNOLOGY ADOPTION IN KERALA

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1. Introduction.

Small-scale fish farming is critical in ensuring food security and employment in many developing countries. Small-scale cage culture for Etroplus suratensis was introduced in the state by the Department of Fisheries, Government of Kerala with the same objectives. The demand for the species has shown considerable increase in the recent years and farm gate prices are as high as Rs 450/kg in the peak season. Elevation to the status of State Fish has also helped the culture of the species in attracting the attention of policy makers leading to promotion of its culture. Cage culture in brackishwater bodies, a relatively new technology to the State, was popularized among the tsunami affected fishermen along with extension and technical support. The implementation of cage culture was promoted through the Brackishwater Fish Farmers' Development Agency (BFFDAs) and Agency for Development of Aquaculture Kerala (ADAK), two subsidiaries of the Department of Fisheries, Government of Kerala. The present study probes the effects and consequences of cage culture technology adoption among farmers based on primary data collected from sample respondents during the initial year of culture.

2. Material and Methods

The cage culture of E. suratensis has been promoted in the brackishwater areas in coastal districts of the state. Nine coastal districts: Trivandrum, Kollam, Alappuzha, Ernakulam, Thrissur, Malappuram, Kozhikode, Kannur and Kasargode, were selected for the study. Three to four farmers formed groups and these groups were trained for implementation of the project. 268 farmers in 88 groups from 21 panchayaths actively participating in this newly adopted technology were surveyed for obtaining the data. The study is based on primary and secondary data collection (Kothari, 1990). Primary data was collected from the sample respondents by personal interview method. The personal interview was conducted with the help of a pre-structured, comprehensive questionnaire (interview schedule), specially designed for the purpose; and

which was pretested with a reconnaissance study. The questionnaire was categorized into group sheet and personal sheet. The secondary data was collected from sources like BFFDA, various journals, periodicals, magazines, reports of the state fisheries departments and websites. The data obtained was analysed for drawing conclusions.

3. Results and Discussion

Descriptive analysis of the data was done separately for individual respondents as well as groups involved in cage culture of E. suratensis in the brackishwaters of Kerala.

3.1. Group-data analysis

Department of Fisheries of the Government of Kerala (62%) and BFFDA's (30%) were the main agencies which provided training for the groups. 74% of the individuals involved in the cage culture have only less than one year experience in any type of fish farming (Fig. 1).

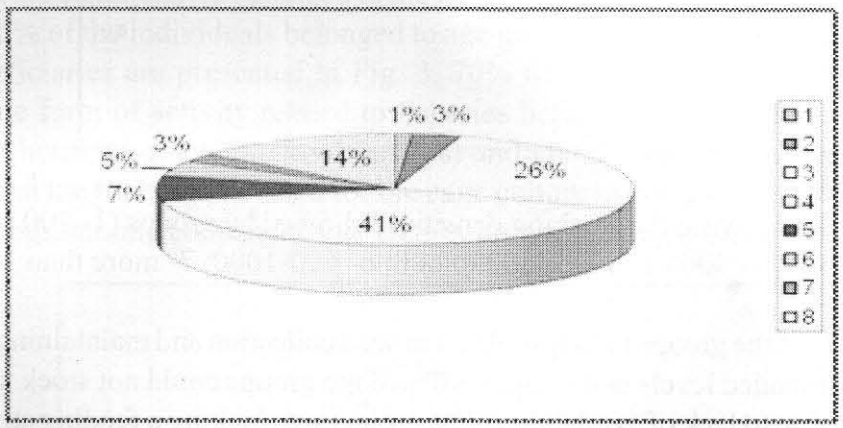

Fig. 1. Pie chart showing the years of experience of individual farmers (1- one to two months, 2-three to four months, 3- five to six months, 4- seven to eight months, 5- nine to ten months, 6- eleven to twelve months, 7- one to two years, 8- more than two years).

The size of the cages used for culture varied marginally between groups. Length of the cages varied between 2-2.25m, width varied from 1.25 to 1.5m and depth varied from 1.25 to 1.5m. 32% of the groups used cages of 2m x 1.5m x 1.5m dimension. The groups were provided with double walled cages to avoid the attack of crabs and rats on cage material, however, 75% of the groups used additional outer covers made of available net materials and unusable nets for increased protection. Number of cages varied between groups, 50% of the groups were given 6-12 cages and remaining groups used less than six cages.

Majority of the groups (74%) installed cages in sites away from sources of any form of pollution, however, all the sites were away from sites of domestic sewage disposal. Within the limited experience in small scale cage culture in the state, 84% of the groups claimed that the climatic changes in the region had no effect on their culture. However, 11% of the groups suffered due to rains and 5% reported extreme summer leading to receding water levels as a constraint. 33% of the groups reported occurrence of algal blooms in the water body and 19% reported mortality in cages due to the algal blooms. Monoculture of E. suratensis was tried in the cages by most groups (85%). Stocking densities in the cages varied from 100 to 200 seeds

per cage to 600 to 1000 per cage (Fig. 2).

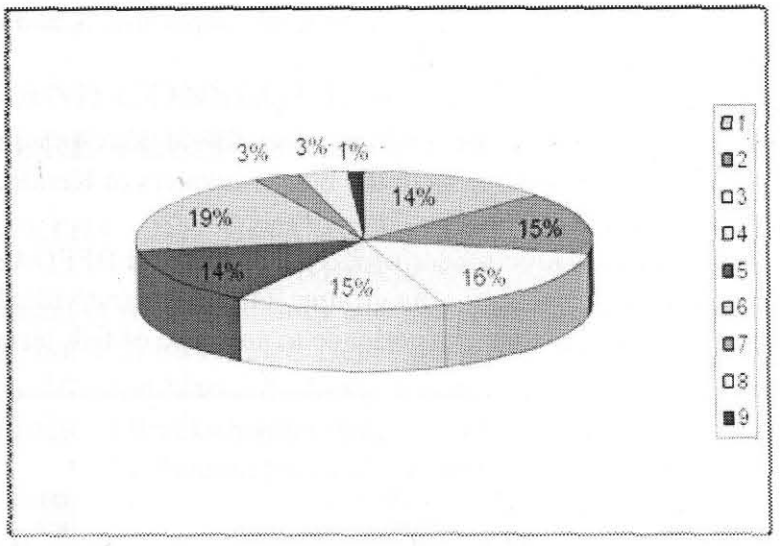

Fig. 2: Pie chart showing the stocking densities followed by groups (1- 100 to 200; 2- 200 to 300; 3- 300 to 400; 4- 400 to 500; 5- 500 to 600; 6- 600-1000; 7- more than 1000; 8- don't know; 9- none).

However, 26% of the groups faced problems in seed collection and maintaining the stocking densities at recommended levels in the cages. 90% of the groups could not stock uniform sized seeds in the cages due to lack of availability. The project was lacking a feeding strategy ideally suited for the species. The groups were using several locally available materials to feed the fishes. Conventional feeds ground nut oil cake (GOC) and rice bran (RB) formed a component in most farm made feeds. Tapioca, fish meal, boiled mussels, vegetable matter, wheat powder, etc. available locally was also fed to the fishes. Commercially formulated pelleted feeds were also used by some groups. All groups procured the materials for feed preparation from the local markets only. The cost of feed ranged from 50-80 per day for the groups. 82% farmers fed the fishes once or twice a day.

The risk factors affecting fishes in cage culture was relatively low. No diseases were recorded during the cage culture by any of the groups. 71% of the farmers reported attack by crabs and rodents on the net materials leading to the escape of fishes. Birds and snakes were also forming risk factors in some cages. 6% groups reported poaching problems in cages. Fouling of nets and frames was another problem reported by the groups. Settlement of waste materials from cages to the bottom was so far not observed in the areas used for cage culture.

The initial performance of the project is lacking in success as only 34% of the groups could harvest the crop, of which 12% of the groups could take more than one successful crop. The groups were also not satisfied with the growth performance of the species in cages. 67% of the groups reported low growth rate in cages where as 26% groups could achieve optimum growth rates. Several problems were recognized by the groups during cage culture. Poor quality

of the net (17%), pollution (6%), algal blooms (7%), availability of seed (6%), sustainability issues (8%) were pointed out by groups in addition to risks for fishes and cages (19%) in the open water environment. There were also reports of incompatibility between members of the groups and poaching causing hindrance in running the project. However, none of the groups attempted any technological up gradation in the practices followed or tried any scaling up of the project.

The groups suggested a scientific study on the reasons for the failure of the culture in many areas. Measures for ensuring supply of seeds at the time of stocking and revaluation of the set of existing practices were also suggested. Providing insurance coverage for cage culture and more practical oriented training programs would help the culture.

3.2. Individual-data analysis

Majority of the beneficiaries belonged to the BPL (59%) category. 22% of the beneficiaries were women. 46% of the individuals belonged to age group of 41 to 50 years, the details of the age of the beneficiaries are presented in Fig. 3. 70% of the beneficiaries were found to be involved in some form of activity related to fisheries before joining the cage culture group. Others included housewives (11%), koolees (8%) and government employees (1%). All the respondents found the training provided for the cage culture useful and were willing to attend more training programs and come back into cage culture following a more successful package of operations.

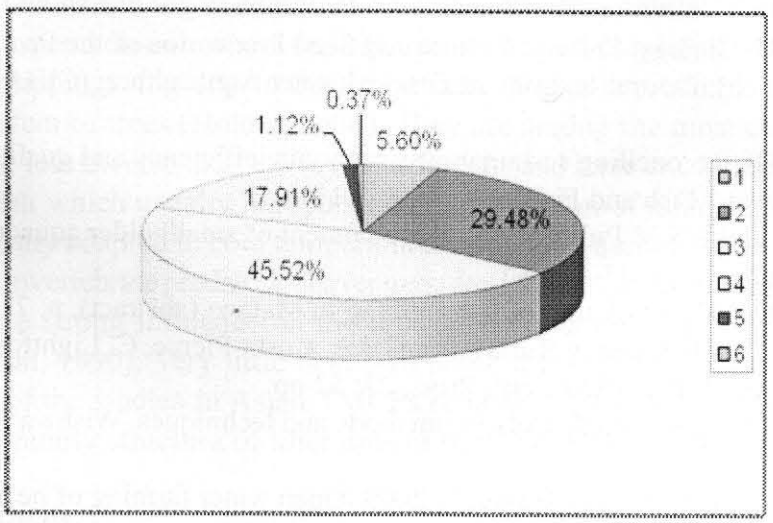

Fig. 3. Pie chart showing the age groups of beneficiaries (1- 21-30 years; 2- 31-40; 3-41-50; 4- 51-60; 5- 61-70 and 6- 71 to 80 years).

Globally, evidences indicate that in many areas similar attempts of fishery management are failing (Cichrame, 2000). Promotion of small-scale fish farming in Africa in the late 1950s and early 1960s as a means of improving the quality of life for poor farmers (Kalinga, 1991) also were unsuccessful. Aquaculture technologies developed elsewhere may not be efficient unless adjustments are made to accommodate the biological, agricultural and socio-economic realities (Costa-Pierce, 1992).

The species used for culture, E. suratensis, is a relatively hardy fish, native to Kerala, which has a relatively poor growth rate compared to other cultivable fishes for both brackish and freshwater bodies in India (CIBA Bulletin, 1995). The performance of the successful cages shows that the species is highly suited for intensive rearing in cages. Padmakumar et al. (2009) observed a growth rate of 0.5-0.9 g/day in small cages in Vembanad Lake. Availability of seeds and a suitable feeding strategy are required for the further development of pearlspot farming in the state. Findings from the interviews indicate that aquaculture is highly valued for its contribution to economic growth in rural areas. Respondents identified a number of issues associated with cage culture. They need to improve culture, knowledge, technical changes and frameworks to mitigate negative social and environmental impacts. Absence of a crop insurance scheme in aquaculture also adds to the misery of the small scale farmers.

4. Conclusions

Results of this study show that the level of adoption of cage culture technology in the Kerala state is low. Most of the groups abandoned the cages after stocking. There is a lack of trust in the technology and its ability to provide economic returns. The motivation level of the farmers has to be improved through demonstrations for further popularizing the culture practice.

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