

e-Souvenir cum Extended Abstracts

National Workshop

Aquaculture as a Livelihood Option for Tribal Farmers of India

18-19 Feb 2019

Editors

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MESSAGE

Since independence of the country, the Government of India has been implementing several developmental schemes/programmes, specifically for the livelihood security of tribal people and farmers of the country. The Indian Council of Agricultural Research (ICAR), through its network of research institutes and Krishi Vigyan Kendras, is also actively engaged in several of these developmental programmes linked to the agricultural sector. Need-based technologies developed by the research institutes have been fruitfully implemented in large parts of the country benefitting rural communities, including tribal populations. Further, several programmes specific for the benefit of tribal communities have also been implemented by the institutes. ICAR-Central Institute of Freshwater Aquaculture (CIFA) located at Bhubaneswar, Odisha has also been actively associated with these needy tribal people through implementation of different developmental projects, organisation of farmers-scientists' interaction meets, facilitating farm visits, and bringing them into the mainstream activities.

I am happy to learn that ICAR-CIFA is conducting a National Workshop on "Aquaculture as a Livelihood Option for Tribal Farmers of India" at its Headquarters Kausalyaganga, Bhubaneswar during February 18-19, 2019. This type of innovative Workshop, I am sure, will create a ripple in the society and provide inroad for the benefit of tribal communities in the country. At a time when the Government of India has also identified Aspirational tribal districts/villages for better attention to those areas, the present Workshop would provide appropriate platform for greater deliberation on different issues and come out with pragmatic action plan for overall development of the communities.

I place on record my sincere appreciation to the organizers of ICAR-CIFA for their effort in organizing this prestigious National Workshop and wish the event a great success.


ICAR, New Delhi
15th February, 2019


(J.K. Jena)

PREFACE

The ICAR-Central Institute of Freshwater Aquaculture is a premier research Institute on freshwater aquaculture in the country under the aegis of the Indian Council of Agricultural Research (ICAR), New Delhi. The Tribal Sub-Plan (TSP) is a scheme to ensure the socio-economic development of the tribal people of India. The TSP is an effort to revamp and revive the constitutional mandates for ensuring better quality of life to the scheduled tribes. The ICAR-CIFA has been working since last three decades on upliftment of scheduled castes (SC) and scheduled tribes (ST) community through freshwater aquaculture technologies. The Institute has implemented over 20 projects, most of them being sponsored by other funding agencies, and disseminated aquaculture technologies like carp breeding, carp seed production, composite carp culture, integrated fish farming, etc. amongst poor people especially SC and ST population. The National Workshop on "Aquaculture as a Livelihood Option for Tribal Farmers of India" being organised by ICAR-Central Institute of Freshwater Aquaculture during 18-19 Feb 2019 in Bhubaneswar, India presents a golden opportunity for tribal farmers, researchers and policy makers of the country to know the present scenario, technology advancement and future program for the development of tribal people through aquaculture.

This Souvenir-cum-Extended Abstracts describes in general the implementation of farming technologies by ICAR, State Governments, Banks and NGOs and their effective adoption to uplift tribal community of India. The tribal farmers are sensitized on various aspects of scientific management of aquaculture and issues related to the adoption of new technologies for their growth and developments are also emphasized. The main focus is on livelihood improvement of tribal through inland open water fisheries management, small scale fish culture, horticulture, backyard animal husbandry, integrated aquaculture and harvest and post-harvest technologies. I acknowledge the authors who have contributed chapters for the Souvenir-cum-Extended Abstract, the organisers and whole ICAR-CIFA family for help in their valuable input and suggestions.



Bindu R. Pillai

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K. Madhu*, Rema Madhu, Bobby Ignatius, Joe, K., Santhosh, B., Swathilekshmi, P. S., B. Dinesh B., Prathibha, R., Divu, D. and Reetha Jayasankar

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ABSTRACT

The technologies developed by Central Marine Fisheries Research Institute (CMFRI) through Farmer's Participatory Research (FPR) on marine and brackish water cage fish farming and allied activities are unanimously adopted as their livelihood option by many farmers in India. The vision of Tribal Sub Plan Project (TSP) is also to improve the level of knowledge and skills to elevate the social and economic status of tribal communities by utilizing coastal resources and infrastructural support. It is therefore these technologies were also given to Indian tribal communities for their socio economic upliftment and develop their skills enough to contribute to the fish production in India. In order to implement this project in India, survey work was conducted in Pathanamthitta, Kollam and Thiruvananthapuram, Nettoor, Thathappally, Ezhikkara and Vaikom in Kerala; Oyyalikuppam village, Rajarethinam Nagar, Senjiamman Nagar and Kallukadamedu at Kottayakuppam village in Chennai; Byndoor and Mulky areas in Karnataka; Chuabahal, Kanthibhaunri, Jugadiha, Balughat, Laing colony, Jugadiha, Jhaga, Baniguni, Parikhi, Jambu, Bhateni, Hari Bank and Parikhi in Orissa; Madhupur and Raipur areas in Gujarat with the help of ST Promoters from the Tribal Welfare Department of respective states to identify the tribal areas in India. Benchmark assessment on the social, historical and livelihood of each village carried out through the initial interaction programmes. Preliminary meetings were held to make an assessment of the community status, their occupation and interest in improving their skills in marine fisheries and aquaculture. An assessment was also carried out to know their present level of involvement into marine fishery related activities, interest to do fish culture, employment status, intensity, investment capacity, resources, options, competitions, space, amenability and viability of the CMFRI technologies and adoption programmes. Later they were invited to CMFRI for interaction and further analysis on their strengths and weakness. Detailed programmes were chalked out to provide training and hands on support and skill development programmes for the identified families of tribal communities in India. The isolated settlement of an important ethnic tribal group of Ulladar in Kerala, Irular in Chennai, Marathy Naik in Karnataka, Khaira, Bhumija, Mahali, Bhuyan, Bhumij, Santal, Bhuyan, Mahali, Kolha, Santal and Kolhain Orissa and sidi tribes in Gujarat were identified for the effective implementation of this project in India. Under this project, these communities were trained to do cage farming of fishes such as Sea bass *Lates calcarifer*, Cobia *Rachycentron canadum*, Pompano *Trachynotus blochii*, Pearl spot *Etroplus suratensis*, Lobster, Groupers, GIFT *Tilapia* etc. depending upon

their amenities to marine and brackish water resources. The farmers were given GI cage structure with mooring, net cages, fish seed and fish feed. The entire work was carried out through periodic evaluation and the harvest was done after 8 to 9 months of culture. As proved by the culture experiment, the tribal farmers were benefitted through cage culture of fishes and they also adopted cage fish farming as livelihood option for their socio economic upliftment.

INTRODUCTION

India is one of the largest country which has highest concentration of tribal population in the world. The scheduled tribe population in India is 8.43 crores as per 2011 census, which accounts for 8.6 per cent of the total population. Tribal communities live in about 15 per cent of the country's areas, in various ecological and geo climatic conditions ranging from plains, forests, hills, aquatic areas and inaccessible areas. Tribal groups are at different stages of social, economic and educational development. At one end of the life spectrum are a few tribal groups that have adopted a mainstream way of life, while at the other end, there are others, who are still primitive. There are over 500 scheduled tribes in India notified under Article 342 of the Constitution of India, spread over different states and Union Territories of the country. It is an established fact that the tribal economy is mainly based on agriculture, medicinal plants collection, minor forest produce, etc. Among the south Indian peninsula states, the largest tribal population occupies (8th position) in Andhra Pradesh. As per the 2011 census, 33 tribal groups with 5.9 million populations were reported only in Andhra Pradesh. However, this group of people have been an inseparable part of the cultural, social and political history of India, and most of them inhabit the traditional tribal areas also known as scheduled areas and every tribal group irrespective of its size of population, has a distinct and unique culture, tradition, and lifestyle of its own.

The concentration of tribal population is very high in rural areas especially in mountain and forest zones when compared to urban areas. Nature here comes forward and joins hands with tribal to fulfil their needs fashioned of course in their way depending on their customs, traditions, demographic structures etc. (Vidyarthi and Rai, 1976). The socio-economic structure in tribal communities is markedly different from that of the non-tribals. They have a very simple technology which fits well within their ecological surroundings and conservative outlook. Moreover, their economy can be termed as subsistence type (Vidyarthi and Rai, 1985). In olden days their economy revolves around forest as they obtain numerous requirements from the area they inhabit with the help of most simple implements and without any technological aid from outside. Agriculture is being the main occupation in the beginning as well as the future for their food security. As they live in ecologically and topographically complex environments, over years, they have developed various methods for cultivation in the available land. The concept of livelihoods has become increasingly popular in development thinking as a way of conceptualizing the economic activities in their totalities. Livelihoods are the means people use to support themselves, to survive and to prosper, which are shaped by the broader environment in which they live and other factors like economic

and cultural systems. The focus of development thinking in the 1970's on employment and jobs has given way to the realization that while job creation in the formal sector continues to be one important strategy for poverty reduction, the reality for poor people in the south is that survival and prosperity depends on the pursuit of diverse and multiple activities simultaneously undertaken by different family members, taking the advantage of different opportunities and resources at different times (Adato and Meinzen, 2002). In this context cage fish farming developed by CMFRI is opening up a new avenue for the livelihood option for the tribals of coastal and water front areas.

Material and methods

The details of the methodology followed in the present investigation were presented under the following heads. Sampling procedure, variables and their measurements, tools of data collection on existing livelihoods of tribal farmers, statistical tests used and analytical procedures followed to interpret the data of the present study. Problems and suggestions of tribal farmers to improve their livelihoods, devices and methods used for collection of data and statistical tools used for analysis of data.

Sampling procedure

The selection of state

The state was selected for the project on the basis of domination of tribal communities, and is generally referred as Tribal areas or tribal state more as the investigator hails from the state. The investigator was familiar with the local language, which would help to build up quick rapport and also enable in-depth study combined with personal observation. In addition to these, in order to conduct cage farming in brackish and marine water areas, coastal states were selected. Coastal areas of the state are predominantly of two types- one is in the brackish water and the other is exclusively marine area of the region where in tribal communities were available.

Selection of area and tribal communities.

The isolated settlement of an important ethnic tribal group of Ulladar in Kerala, Irular in Chennai, Marathy Naik in Karnataka, Khaira, Bhumija, Mahali, Bhuyan, Bhumij, Santal, Bhuyan, Mahali, Kolha, Santal and Kolha in Orissa and sidi tribes in Gujarat were identified for the effective implementation of this project in India. In order to empowering these tribal people with alternative livelihood options, CMFRI centres operational at Gujarath, Visakhapatnam, Odisha, Chennai, Mandapam, Mangalore, Trivandrum, Kochi has selected tribal communities from these areas who are below the poverty line and also have access to open water/ access to marine brackish and freshwater resources. After selecting the tribals filed level interactions with these tribal, visit to their locality, meeting with tribal group leaders, organising them into small groups for undertaking fish culture etc were done. They were also given hands on training on cage fabrication, float tying, cage mooring, net exchange, seed transportation, seed handling, seed

grading, seed rearing, rearing of sub adults, and adults, daily feed management, feeding, cage maintenance, fish harvest and marketing.

Results and Discussion

The living status of tribal communities (Education, Land holding, Farming experience, Family size, Tribe, Occupational status, Expenditure pattern, Trainings undergone, Economic orientation, Market orientation, etc.) are varied according to their state in India. More than 70% of Ullardar are jobless and few of them working in agriculture and collection of tribal medicinal plant from the forest. More than 50% of the Irular communities were occupied with sand worm collection, oyster and clam picking, fishing by hooks and line (silver biddies, sea bass, tilapia, cat fishes) and cast net fishing (mulletts, clupeids, crabs). Most of the Sidi tribe are jobless and few of them engaged in agriculture and fishing activities. The selected tribes in Odisha are engaged in agriculture. The programmes for capacity building such as trainings, FLDs, exhibitions, exposure visits and workshop were conducted on cage fabrication, mending of cage nets, net tying, launching and installing/anchor mooring, stocking, live fish packing, transportation, handling, rearing, feed preparation and its feeding, net exchanging, scuba diving, fabricate mussel seeding and spat collecting devices, rafts, rope culture systems, depuration of oysters and mussels, chucking and meat quality assessments grading and packaging them at selected tribal dominated area in Kerala, Chennai, Orissa and Karnataka were conducted. The cages were handed over or launching the cages soon after completing the training only. GI and HDP cages of CMFRI design 6m and 4 dia circular and 4m x4m square fabricated and nets with floating barrels, feed and seeds, and cage mooring were given with free of cost. The established CMFRI technologies such as mussel culture, cage maintenance and feeding in Byndoor and Mulky areas in Karnataka; sea bass *Lates calcarifer*, cobia *Rachycentron canadum* and silver Pompano *Trachinotus blochii* fingerlings, spiny and sand lobster seed, oyster, mussel were cultured in Chennai; asian seabass *Lates calcarifer*, mangrove redsnapper *Lutjanus argentimaculatus* along with groupers and carangids like *Caranx ignobilis* and *Gnathanodon speciosus*. *Epinephelus coioides* were cultured in cage in Kerala. Mud spiny lobster, *Panulirus polyphagus* and *Cobia R. canadum* in the cages in Gujarat. Most of the tribal communities were earned 1.5 to 2.2 lakhs / cage for the 3-7 months culture period.

Empowerment of tribal communities in various states of India

Chennai

Under the alternative livelihood programme for the Tribal community in the coastal Thiruvallur, the fishermen members of the Irulars in Senjiamman Nagar (100 odd families), Kottaikuppam Panchayath were chosen as the beneficiary and trainings were extended to the young members. Four GI cages (4.4m OD, 3m ID inflated barrel floating type) were fabricated and installed in the northern end of the Pulicat lake nearer to the bar mouth, after necessary siting studies and consultation with the Wild Life department

officials and other fishermen communities. As the culture conditions favour euryhaline species, Asian sea bass was chosen as the candidate for culturing in the units. The 3120 seeds (7-8cm) procured from RGCA, Sirkazhi was procured and stocked in the nursery hapas. Training on grading was also extended. The identified families are camping at site to operate the cage units on a daily basis. The cage units are also serve the community as temporary growout/live holding units for locally fished species (Pearlspot, mullets, milkfish, scats, carangids, snappers) indirectly caught at smaller sizes in usual fishing methods. The domestic value for certain species like mullets, milk fish, pearlspot, scats and mussels and clams is comparatively very less here and therefore the local catches do not fetch them a good value. If marketed to neighbouring markets and better avenues, higher revenue could be generated from the available resources. A live consignment of nearly thousand fry (1-2 inches) of pearlspot gathered from other local fishery discards were segregated in cage hapas and sold to the Department of Forests, as a gesture towards the concern for stocking the fish was depleted vedanthangal bird sanctuary in the Kancheepuram district, Tamilnadu. The demonstrated the marketing options of live fish and higher value realisation through the cage farming methods. An options for creating this trade is being worked out with the Department of fisheries, Tamilnadu.

Harvest of cage-grown fishes

Harvest of cage grown fishes at Senjiamman nagar, Pulicat under the TSP programme for the Irular (ST) marine fisherfolk was done. A 160 numbers of Asian seabass *Lates calcarifer*, weighing 161 kg and 97 numbers of mangrove snapper *Lutjanus argentimaculatus* weighing 87 kg were harvested, along with groupers and carangids like *Caranx ignobilis* and *Gnathanodon speciosus*. The total value realized was Rs 1 lakh.

Gujarath

The sidi tribals of Gujrath were given 25 GI circular cages (6m dia) under this project and they were given hands-on training on complete package of practices of cage installation in the sea as well as sea cage farming. The cages were launched at Somanath sea area and cages were stocked with lobster seeds, Cobia, *Lates calcarifer* and pompano. The tribals were provided GI cags, net cages, seed and feed for under taking cage fish farming through TSP funding from CMFRI. The groups formed by tribals are undertaking sea cage farming as a livelihood option and during past 10 years of sea cage farming, their economic status has improved a lot from the previous condition.

Kerala

Cages were installed at Ulladar colony at Vaikom, Nettoor, Ezhikkara, Thathapally of Kochi Kerala. The tribal people were given exposure and hands own training on various stages of cage farming right from fabrication of cage, installation of cage, cage management fish stocking fish seed handing, fish seed rearing, feeding, feed management, net exchange, monthly sampling, fish harvest and marketing. The

cages were stocked with *Etroplus suretensis*, *Lates calcarifer* and pompano. The result obtained in the demonstration cum experimental culture was successful and the jobless tribal are attracted towards this method of fish farming and has widely accepted. This also attracted the attention of tribal communities of other areas and many of these centres are also been used as a demonstration cum filed training centres for bringing more tribal group in to this profitable and amenable livelihood option.

Suggestions

- 1) As many of the tribal communities are settled at land locked areas, amenities for marine, brackish or freshwater resources are limited. In order to conduct cage fish farming which is a profitable venture and it can be easily adopted by tribal groups, government need to be initiated to provide lands with water resource amenities for tribal communities.
- 2) Access to many tribal colonies are very difficult due to lack of proper road. It is a hindrance for the transportation of cage material to the sites, live seeds to the site and transportation of harvested fishes to the markets.
- 3) A special wing in for TSP should be implemented in each institute with involvement of scientist of Agriculture, Animal husbandry, Poultry and fishery so that they can be trained for integrated farming for their upliftment utilizing their present available amenities/ land holdings.
- 4) The study shows that most of the tribal farmers were middle aged hence there is every need to attract youth by creating more avenues and enterprise based activities in agriculture.
- 5) There is a need to increase knowledge of tribal farmers by imparting suitable training programmes, demonstrations and organizing regular field visits by extension officers to other tribal farmer's fields to create the awareness various livelihood activities like cage farming.
- 6) The medium trend observed in case of information seeking behaviour highlights that there is every need to enhance the capacities and capabilities of the tribal farmers to seek information from various sources.
- 7) Government should take initiation to provide remunerative price for their product.
- 8) Majority of the tribal farmers are marginal and small. Modern technologies should be developed to suit the needs and requirements of these farmers. Especially the technologies should be user friendly, low cost and compatible.
- 9) Government should also give more funding for human capital aspects such as better health care facilities, good drinking water provision, opportunities for education, etc.
- 10) The younger generation of the tribal farmers is showing more interest in the cultivation of more economic crops and varieties. Hence there is an urgent need to create a suitable environment for the transfer of the indigenous knowledge from the older generations to younger generations.