

# Dissemination of cage culture technology among Scheduled tribes in Coastal Andhra Pradesh – A successful model for livelihood improvement

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The central government of India introduced the Tribal Sub-Plan (TSP) with an aim to bridge the gap between the schedule tribes (STs) and the general population with respect to socio-economic development indicators in a time-bound holistic manner. This plan has been effectively implemented by the Government of India through different state and central government agencies with research institutions functioning under Government of India also actively involved in working for welfare of the tribal communities including skill development programmes with recent viable technologies. Cage farming technology has emerged as one of the most important farming methods in mariculture for enhancing fish production. The cage culture methods for marine fin fishes such as Asian sea bass, Indian pompano, silver pompano, orange spotted grouper and mangrove red snapper has been demonstrated by ICAR-CMFRI in different places of the country. Cage farming can be efficiently utilised by the tribal population living in the vicinities of the water bodies, who are generally considered as landless or having mere land areas.

In Andhra Pradesh, culture of marine finfishes such as Indian pompano and Asian seabass has been demonstrated in cages in Krishna and Godavari backwaters by Visakhapatnam Regional Centre of ICAR-CMFRI under different programmes by involving fishermen and marginal landless aqua farmers. Among the tribes, Yenadis are numerically the third largest scheduled tribe in the state of

Andhra Pradesh and are mostly distributed in the coastal districts of Nellore, Prakasam, Guntur, and Krishna. The TSP programme was first initiated during 2018-19, with a group of 30 people under Yenadis tribal community from Maripalem village, Nagayalanka Mandal, Krishna District and was demonstrated using three square shaped cages prepared from Galvanised iron. In the subsequent years, under the same plan, 13 cages were installed in different places of Krishna districts including Peddapalem village (Nagayalanka Mandal), Eduromundi village (Nagayalanka Mandal), and Laxmipuram village (Kruthivenu Mandal) and are presented as case studies.

## Case study -1: Cage culture of Indian pompano at Maripalem, Nagayalanka, Krishna District, Andhra Pradesh

Harvest of Indian pompano reared in high saline estuarine cages by the Yanadi Tribal community was carried out on 24<sup>th</sup> May, 2020 in the presence of tribal beneficiaries, farmers and fishermen at Nagayalanka, Krishna district, Andhra Pradesh. The programme initiated in April, 2019, with three Galvanized Iron (GI) cages measuring 5 x 5 x 2.5 m in size which were installed in the high saline estuaries of the Krishna river at Nagayalanka with the active involvement of the Yenadis tribal community attached with the Antyodaya Women Mutually Aided



Harvest of Indian pompano at Maripalem, Nagayalanka, Krishna District

Co-operative Society under the supervision of ALERT/ATMA, a non-governmental organization. Thirty tribal beneficiaries belonging to Maripalem village, a coastal village in Krishna district, were selected. Hatchery produced seeds of Indian pompano at Visakhapatnam RC of ICAR-CMFRI were nursery reared for three months, and then stocked in cages. In July, 2019, grow-out culture was initiated at a stocking weight of 80 g with density of 15 nos/m<sup>3</sup> (N = 950 numbers/cage) in all cages. The stocked fishes were reared for 10 months, and were fed four times daily with pelleted feed containing 40% crude protein (CP) and 10% crude fat (CF). The cultured fishes were harvested on 25<sup>th</sup> May, 2020 at an average weight of 745g; with a survival of 97.3%, FCR of 1:1.62 and a biomass of 10.86 kg/m<sup>3</sup>. The harvested fishes were sold to Maxwell Sea Foods, Cochin at the rate of ₹330/kg. A part of the revenue generated was shared among the tribal beneficiaries and the remaining amount was kept as common corpus fund to meet the operational expenditure for the next culture.

## Case study -2: Cage culture of Indian pompano at Peddapalem Village, Nagayalanka Mandal, Krishna District, Andhra Pradesh

Hatchery reared Indian pompano were stocked in 4 estuarine cages at Peddapalem, Nagayalanka Mandal,

Krishna District, Andhra Pradesh which were managed by 40 beneficiaries from Yenadis community from five different villages. The cages made of Galvanised Iron pipes of 5x5 m size with a 3 m net depth were stocked during November 2020, with nursery reared Indian pompano of 25.0 ± 5.0g in weight @13 numbers/m<sup>3</sup>. Pelleted diet with 40% crude protein and 10% crude fat was given four times daily at 6 to 2 % of body weight. The fishes reached to an average size of 675.0 ± 25.0 g after



Harvest of Indian pompano at Peddapalem, Nagayalanka, Krishna District





Harvest of cage cultured Asian Seabass under Tribal Sub Plan Component at Laximipuram, Nagayalanka, Krishna District

seven months and were harvested during June, 2021. About 575 to 600 kg were harvested from individual cages which were sold at ₹295 per kg to wholesale fish traders in Chennai, Tamil Nadu. The income from was shared among the beneficiaries.

### Case study -3: Cage culture of Asian Seabass at Laxmipuram Krishna District, Andhra Pradesh

Asian seabass was stocked in two estuarine cages at Laxmipuram village, Kruthivenu Mandal, Krishna District, Andhra Pradesh with 30 beneficiaries belonging to Yenadis community. The cages made using Galvanised Iron pipes of 5x5 m size with a 2.5 m net depth were stocked during October, 2020 with nursery reared Asian Seabass of  $80.0 \pm 5.0g$  in weight at 15 numbers/m<sup>3</sup>. Stocked fishes were fed with chopped low value fish (Tilapia), thrice a day at 3 – 10% of body weight, depending on the fish growth during different periods of culture. The fish reared for 8 months was harvested on 17<sup>th</sup> June, 2021 and each fish had attained an average weight of 725g ranging from 650 to 1150 g. A total of 865 kg of fishes were harvested from the two cages at approximately 430 kg per cage. Harvested fishes were sold at the rate of ₹300/kg and the income of ₹ 2.6 lakhs was shared among the beneficiaries.



Cage culture of Asian Seabass under Tribal Sub Plan Component at Laxmipuram, Nagayalanka, Krishna District



Skill development programme organised at Maripalem, Nagayalanka Mandal, Krishna District



Skill development programme organised under Tribal sub plan at Peddapalem, Nagayalanka Mandal, Krishna District

## Skill development programme on cage culture of finfishes

Different training and awareness programmes were organised since 2018 under Tribal Sub Plan component, to bring awareness and inculcate technical knowhow on cage culture of marine finfishes among tribal beneficiaries. During the financial year 2018-19 to 2020-21, five training programmes and 13 awareness programme were organised and around 300 persons benefitted. Different aspects of cage culture including cage fabrication, installation and maintenance; feeding and disease management, harvest and sources of financial support available for cage culture were apprised to trainees. The beneficiaries trained by the Visakhapatnam ICAR-CMFRI Regional Centre have gained skill and will now act as trainers for the new comers who wants to initiate cage farming.

## Way Forward

Most of the tribal families are landless and without any permanent source of income. They meet their daily expense working as daily workers in different sectors including agriculture, shrimp farming, artisanal fishing in small scale, and other small scale works. Due to urbanisation, many youths and elderly males working in daily wages or monthly salary in small shops/malls/workshops and offices. Most of the male population are willing to work as daily labours for meeting family expenses. Many had initially hesitated to venture into cage culture of finfishes, since it is a new area of work for them that would take atleast 10 – 12 months to reap the benefit. On involvement in cage culture, they would have to spend their time in cages, and might not be

able to earn money till the fish is harvested. In spite of providing 100% monetary support under Tribal Sub-plan component, therefore, many were reluctant. However, after attending the several awareness and training programmes organised by Visakhapatnam Regional Centre of ICAR-CMFRI, several showed willingness to venture in the cage culture of marine finfishes.

The concept of cluster cage culture approach and two-tier culture system was appraised to them which was well accepted as sustainable source of income from the coastal backwaters. In a cluster based approach, a set of 5 or 10 cages would be installed in a single place and can be managed by an individual from the group in rotation basis either on alternative days or week basis on their convenience. By this way, all can equally participate in routine cage culture activities and at the same time, can manage their daily livelihood by performing other works. In two-tier based culture system, the culture period could be reduced by performing separate nurseries in parallel to grow-out. Both the concepts have convinced many from Krishna district of Andhra Pradesh, and several exhibited interest to venture in cage based marine finfish culture. Also, some of the beneficiaries are continuing the cage culture activities without seeking further financial support under the plan and a few groups have initiated their own culture using the concept of capture based aquaculture. The marine fish cage culture model established for marine fish by Yenadis tribal communities in Krishna backwaters is seen as a role-model for landless tribes, who do not have any reliable source of income. This model could be emulated among different groups of landless population living in various coastal districts of Andhra Pradesh, for their livelihood improvement.