National Training on *Cage Culture of Seabass*

CMFRI, Cochin: 14 - 23 December 2009

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The United Nations has projected the human population to reach 9.2 billion by 2050, which is within estimates of the maximum carrying capacity of the planet. Available water resources appear insufficient for agriculture to meet the food demands of 9.2 billion people. The present population already experiences water stress because of the impact of population growth and climate change. In addition, global fisheries landings have been declining since the mid-1980s, adversely impacting on the current food production crisis. Under this scenario, mariculture, the food-producing sector, will be enlisted to lend support to the endeavours at augmenting food production for the humanity in the 21st century. Global terrestrial food production and marine primary food production are comparable in magnitude, but marine food now contributes only 2% to the human food supply, as the development of farmed aqua food production from the ocean lags several millennia behind that on land. However, aquatic food provides about 16% of the protein that humans consume. Since large-scale mariculture should be the mainstay of the response to looming food crises, it is imperative to determine what is required to bring more of areas under mariculture. In India, the marine capture fish production is unlikely to increase from the present trend. Therefore the greater contribution of the oceans to feeding humanity must be derived largely from mariculture only. For this effort to be successful, mariculture would have to be put in focus, besides the current dependence on capture fisheries. There has to be also enhancement in the production of edible algae and filter-feeder organisms, besides controlling environmental impacts, and increasing integration with food production on land. There has to be also transfer of attention to sea food for animal protein and have innovations in mariculture practices with specific areas identified for open sea cage culture. Accommodating these changes will enable the oceans to become a major source of food, which it is believed will constitute the next food revolution in human history.

Cage Culture

Cage aquaculture has grown enormously during the past 25 years all over the world. It is presently undergoing great innovations in response to globalisation and the growing demand for aquatic products. Population growth, increased level of affluence and fast urbanisation in developing countries are leading to major changes in supply and demand for animal protein, from both terrestrial livestock and fish. It has become imperative for India to identify new and suitable sites for aquaculture and oceans offer unlimited opportunities in this regard. Cage culture is now expanding into new untapped open-water culture areas such as lakes, reservoirs, rivers and coastal brackish and marine inshore and offshore waters. Moreover, there is a growing awareness that the possibilities offered by cage aquaculture have only just begun to be explored in India. It offers not only production of food fish, but also it forms an alternative to conventional land based hatcheries, nurseries and even for rearing broodstock fishes in a more natural environment. It can also be employed for rearing of oceanic fishes like tuna and the most sought after crustaceans like lobsters.

Background

Within the Fisheries Division of the Indian Council of Agricultural Research (ICAR), the Central Marine Fisheries Research Institute (CMFRI) is responsible for all activities related to development of mariculture. CMFRI has initiated many successful mariculture activities including breeding and culture of edible oysters, pearl oysters, mussels, marine ornamental fishes, sea cucumbers, etc. As the recent success story, CMFRI has pioneered in introducing open sea cage culture of Asian seabass and lobsters at different locations in India. With the objective of dissemination and sharing the information and experience in this emerging field of mariculture, and to enhance the competency and confidence of participants in the area, a national training programme on "Cage culture of seabass" was organised by Central Marine Fisheries Research Institute (CMFRI), under the auspices of National Fisheries Development Board (NFDB), Hyderabad, from 14 to 23 December 2009 at CMFRI, Post Box No. 1603, Ernakulam North P. O., Kochi – 682 018, Kerala. The training was funded by NFDB, Hyderabad. Dr. Imelda Joseph, Senior Scientist, Mariculture Division, CMFRI, was the Course Coordinator. The training programme was inaugurated on 14th December 2009 at 10.30 am by Dr. G. Syda Rao, Director, CMFRI by lighting the ceremonial inaugural lamp. Dr. G. Gopakumar, Head, mariculture Division & SIC, Mandapam Regional Centre of CMFRI welcomed the invitees and participants. In his inaugural address, Dr. Syda Rao laid emphasis on the need for initiation and expansion of Mariculture in India. Dr. Imelda Joseph, Senior Scientist & Course Coordinator had proposed the Vote of Thanks. All CMFRI staff members including the Heads of Divisions, Scientists, Technical, Supporting, Administrative, Audit and Research Scholars, Trainees and the Staff of CIFRI and NBFGR Cochin units were invited for the function.

There were 25 participants in the training programme from six maritime States (Kerala, Tamil Nadu, Maharashtra, Gujarat, West Bengal and Orissa) of India and UT of Andaman & Nicobar islands. Those who participated in the training were representative of a cross section of positions within the fisheries sector. They included the State and Central government officials (Supt. of Fisheries, Inspector of Fisheries, Technical Assistants, Extension Officers, Fisheries Officers and Marketing/ Coordinating personnel), entrepreneurs, research assistants and farmers from different maritime States in India. The Course Manual was released on 14-12-09 by Dr.G. Syda Rao, Director, CMFRI, during the inauguration of the training.

There were 24 sessions (21 class room sessions and 3 field trips during the training, handled by eminent resource persons from CMFRI, Central Institute of Fisheries Technology (CIFT), Central Institute of Brackishwater Aquaculture (CIBA) and

Marine Products Export Development Authority (MPEDA). The course included various aspects of Cage culture with emphasis on open sea cage culture. During field trips, the trainees were exposed to almost all the aspects of cage culture operations like: materials, structure of cage frame, mooring, nets of different types and mesh sizes in open sea cages at Kanyakumari as well as open brackishwater cages at Cochin. They were exposed to nursery phase of raising of seabass fingerlings, their packing and transportation for stocking in open water cages, stocking in grow out-cages, feeding fish in cages, on board trips to cage site in open sea and open waters. Hands-on sessions were conducted in majority of the cage culture aspects.

On the final day of training, the cage culture team at CMFRI, Cochin (Dr. Imelda Joseph, Dr. Shoji Joseph and Dr. Boby Ignatius), along with Dr. G. Syda Rao, Director CMFRI participated in a discussion session with trainees. In this session several aspects of open sea cage culture, which could not be perceived during the previous sessions, were covered. A good response was there and the trainees could broaden their knowledge on the subject. Pre-training and post-training knowledge evaluation was conducted and a feedback was taken from the trainees after the completion of the course.

The valedictory function of the national training programme was held on 23rd December 2009 at 2.30 pm. Dr. B. Meenakumari, Director, CIFT, Kochi, was the Chief Guest. Dr. G. Syda Rao, Director, CMFRI, presided over the function and Dr. Grace Mathew, Head In charge of Mariculture Division, CMFRI, welcomed the invitees and participants. Dr. Imelda Joseph proposed the vote of thanks. Dr. B. Meenakumari, the Chief Guest had distributed participation certificates to the 25 trainees. The function was attended by the Heads of the Divisions of CMFRI, resource persons of the training, and training committee members along with the participants.

During the valedictory function, Mr. Krishnababu, J. Supt. Of Fisheries, Gandhinagar, Gujarat, Mrs. Mary Leema, National Institute of Ocean Technology (NIOT), Andaman and Mr. Aboo Backer, Aquaculture Foundation of India, Chennai expressed their views, highlighting usefulness of the training.

It has been concluded that the imparting of training to the State government officials, stake holders and entrepreneurs in the fisheries sector and the knowledge and skills necessary to initiate open sea cage culture in different maritime States of India by conducting the National Training on Cage Culture of Seabass has been a significant success. Twenty four training sessions were conducted for the participants coming from all major maritime States in India. The course contents covered the areas of cage culture and the skills required of fisheries professionals and stake holders to initiate cage culture effectively through expertise acquired from CMFRI. They also took into account the regional issues to be taken care of when working in different geographical locations. These have enhanced the perceptions of the participants. Due to the good response, it has been recommended to NFDB that periodical training up in open sea cage culture may be included in training programmes related to different States in India.

The class room sessions during the training are as follows:

Sl. No.	Title	Faculty
1	Overview on mariculture and the opportunities and challenges of cage culture in India	Dr. Syda Rao, G.
2	History of cage culture, cage culture operations, advantages and disadvantages of cages and current global status of cage farming	Dr. Gopakumar, G.
3	Commercialization of Asian seabass, *Lates calcarifer,* as a candidate species for cage culture in India	Dr. Kandan, S.
4	Engineering aspects to be taken care in cage culture of seabass	Mrs. Shylaja, G.
5	Netting specifications and maintenance of cages for finfish culture	Dr. Saly N. Thomas
6	Principles and practices of cage mooring	Dr. Boby Ignatius
7	Taxonomy, identification and biology of Seabass (*Lates calcarifer*)	Dr. Grace Mathew
8	Nursery rearing of seabass fry and importance of grading and seed transportation	Dr. Shoji Joseph
9	Important management measures in cage culture	Dr. Imelda Joseph
10	Integration of seaweed (*Kappaphycus alvarezii*) and pearl oyster (*Pinctada fucata*) along with Asian seabass (*Lates calcarifer*) in open sea floating cage off Andhra Pradesh coast	Dr. Biswajith Dash
11	Nutritional requirements of Asian seabass, *Lates calcarifer*	Dr. Ambasankar, K.
12	Feeds and feeding of seabass in hatchery, nursery and grow out system using formulated feeds	Dr. Ambasankar, K.
13	Success in hatchery development of seabass and its potential for commercial cage culture in India	Dr. Thirunavukkarasu, A. R.
14	Importance of water quality in marine life cage culture	Dr. Prema, D.
15	Diseases of seabass in cage culture and control measures	Dr. Sobhana, K. S.
16	Open Sea Cage Culture in India - A Sociological Perspective	Dr. Ramachandran, C.
17	Grow out culture of seabass in cages	Dr. Boby Ignatius
18	Open sea cage culture: carrying capacity and stocking in the grow out system	Dr. Shoji Joseph
19	Growth in fleet size and investment in marine fisheries and scope for open sea mariculture	Dr. Sathiadhas, R.
20	Economic analysis of cage culture of seabass	Dr. Narayanakumar, R.
21	Geographic information systems and site selection issues of open sea cage culture	Dr. Jayasankar, J.

National Training on Cage Culture of Seabass
Inauguration (14-12-09)

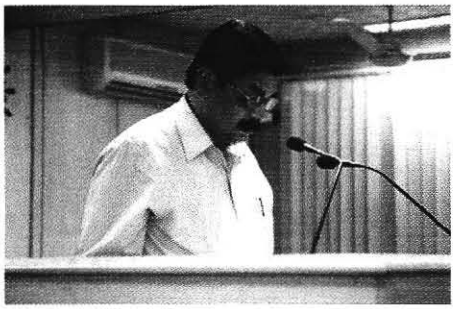

Fig. 1 : Welcome address Dr.G.Gopakumar

Fig.2: Lighting of the Ceremonial lamp by Dr.G.Syda Rao, Diretor, CMFRI

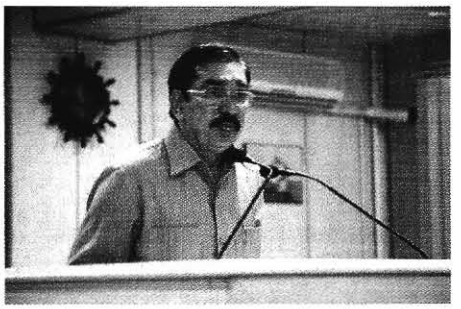

Fig. 3: Inaugural Address by Dr.G.Syda Rao

Fig. 4: Part view of the participants at the inaugural session

Fig.5: Release of the Course Manual

Fig. 6 : Vote of thanks by Dr. Imelda Joseph

Training Sessions under way at CMFRI

Fig. 7: Dr. G.Syda Rao, (Mariculture overview)

Fig.8: Dr. Imelda Joseph (Management measures)

Fig. 9: Dr. Grace Mathew (Taxonomy)

Fig.10: Dr. Kandan, S (Commercialisation of seabass)

Fig.11: Dr. Biswajith Dash (Polyculture)

Fig.12: Dr. Arasu, A.R.T. (Hatchery production)

Training Sessions

Fig. 13: Discussion by the Director with cage culture team

Fig. 14: Faculty Interaction

Fig.15: Trainees through sessions

Field Visits

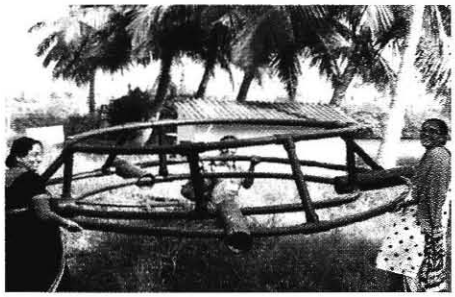

Fig. 16&17 : Trainees with sea cage

Fig. 18: Seabass Nursery

Fig.19: Interaction with fishermen

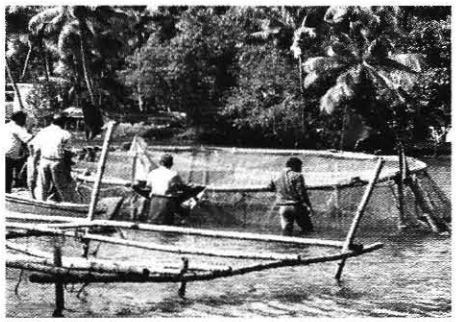

Fig.20: Seabass seed transfer to cage

Fig.21: Trainees at the Cage in Cochin

Field Visit to Kanyakumari

Fig. 22: Field visit to Kanyakumari by trainees

Fig. 23&24: Trainees at Kanyakumari on board a vessel.

CMFRI Cochin

Fig. 25: Trainees at CMFRI Research hatchery, Cochin

Fig.26: Trainees at CMFRI Aquarium, Cochin

Fig. 27: Trainees at Library, CMFRI, Cochin

Valedictory Function (23-12-2009)

Fig. 28: Welcome Address by Dr. Grace Mathew

Fig. 29 : Dr. B.Meena Kumari, Chief Guest, addressing the trainess

Fig. 30: Presidential Address by Dr. G.Syda Rao

Fig. 31: Dr. Grace Mathew speaking

Fig.32: Participants

Fig. 33: Certificate Distribution

Fig. 34: Reflections presented by the Trainee

Fig. 35: Vote of Thanks by Dr. Imelda Joseph

Fig. 36: Trainees with Director, CMFRI, Course Coordinator & Faculty Members