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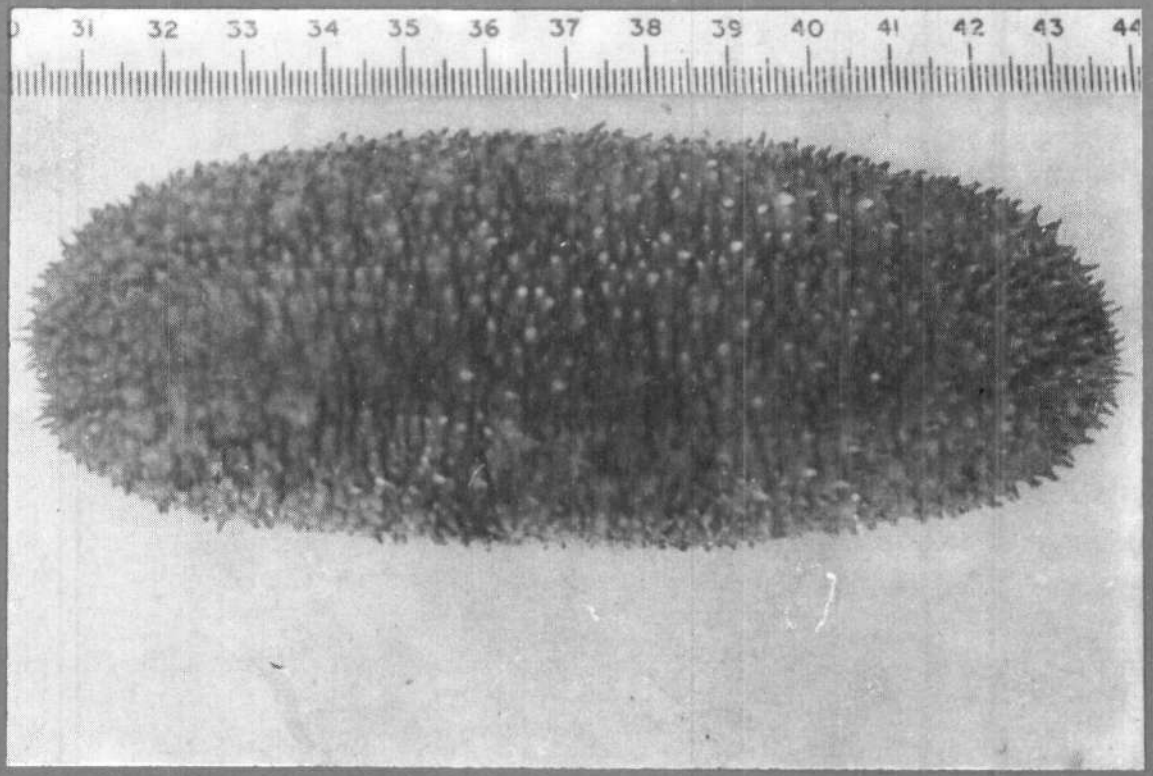

तकनीकी एवं विस्तार अंकावली
TECHNICAL AND EXTENSION SERIES

केन्द्रीय समुद्री मात्स्यिकी अनुसंधान संस्थान कोचिन, भारत
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE COCHIN, INDIA

भारतीय कृषि अनुसंधान परिषद
INDIAN COUNCIL OF AGRICULTURAL RESEARCH

समुद्री मात्स्यिकी सूचना सेवा : समुद्री मात्स्यिकी पर आधारित अनुसंधान परिणामों को आयोजकों, मत्स्य उद्योगों और मत्स्य पालकों के बीच प्रसार करना और तकनोलजी का प्रयोगशाला से श्रमशाला तक हस्तांतरित करना इस तकनीकी और विस्तार अंकावली का लक्ष्य है।

THE MARINE FISHERIES INFORMATION SERVICE : Technical and Extension Series envisages dissemination of information on marine fishery resources based on research results to the planners, industry and fish farmers and transfer of technology from laboratory to field.

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RESEARCH PERSPECTIVES OF THE CMFRI*

M. Devaraj

Central Marine Fisheries Research Institute, Cochin - 682 014

In July 1994 the Indian Council of Agricultural Research has reconstituted the Staff Research Council (SRC) and created a new body called the Research Advisory Committee (RAC) for each ICAR Research Institute by incorporating Rule 71 (A) to (M) under Chapter XIII of the Rules of the ICAR Society. The RAC and the SRC have been so constituted that the external experts in these two bodies will have a key role in advising the Institutes on the thrust areas for R & D. Besides, they would be critically reviewing and assessing the research activities and achievements. This exercise is expected to help the Institutes take appropriate strategies and tactical steps to minimise the impediments stalling progress and to maximise R & D outputs.

At this moment when we are being made more alert and conscious of our R & D responsibilities through the induction of external experts in the RAC and the SRC, we need to re-examine and place before us the major R & D concerns of the marine fisheries sector of the country. The major areas of concern in today's Indian marine fisheries R & D need to be identified and the research projects so designed that they address these problems effectively. The RAC and the SRC have the responsibility to look into this question in depth and guide us in the right direction. The research projects are the real instruments through which the Institute achieves its goals and objectives and therefore we need to ensure that these serve our purpose well. Some of the major areas requiring immediate attention are outlined below.

1. Over exploitation of certain stocks and fishing zones is currently an area of concern. The gravity of this problem, where it occurs, should be assessed and resolved. We need to assess the status of the constituent stocks and their fisheries for each major ecological province. We also need to indicate the optimum level of exploitation in the context of multi-species/multi-gear fisheries in terms of the bioeconomically optimum effort and mesh size.

As a logical corollary to this study, we should determine the idle fleet capacities, the idle manpower and the idle processing plant capacities, where they exist, so as to progressively contain the problems of economic mismanagement which have become so very characteristic of our marine capture fisheries sector.

The active involvement and participation of the fishing community and the industry in the judicious management of marine fisheries is crucial in sustaining production at the optimum levels. It is therefore urgent and important to implement a comprehensive programme of community education of the fishermen on the mechanism and modalities of fisheries management for progressively restoring the over capitalised fleets and suboptimal mesh sizes to their optima. Towards this, we must have an interdivisional/interdisciplinary national research project on fisheries management with well defined objectives and technical programmes with the active participation of the CMFRI Divisions of: a) Fisheries Resources Assessment and b) Socio-economic Evaluation and Technology Transfer and possibly others including the trade, processors, exporters, NGOs, the fishermen organisations and the fisheries departments. In this regard the recommendation of the Quinquennial Review Team (from 1986 to 1993) of the CMFRI to create a new Division of Fisheries Management is being implemented by the Institute.

2. Fishery forecasting in the Indian tropical, multispecies marine ecosystem should be attempted with the CMFRI database in conjunction with the meteorological data from the Indian Meteorological Department (IMD) and the potential fishing zone maps issued by the National Remote Sensing Agency (NRSA). We can have distinct ecological provinces identified as the basic geographical units for such fishery predictions. The following areas can be considered as the major ecological provinces in the Indian continental shelf: (i) the high tidal amplitude province comprising the Saurashtra-North Maharashtra coast, (ii) the Malabar upwelling province between Ratnagiri

* Extract from the introductory remarks of the Director for the first meeting of the re-constituted Staff Research Council of CMFRI in March 1995 at Cochin.

and Vizhinjam, (iii) the Gulf of Mannar province, (iv) the palk strait province, (v) the Coramandal coast (vi) the seasonally low saline Godavari-Krishna coastal Andhra Province, (vii) the Sandheads province, and (viii) the high tidal amplitude north Orissa-West Bengal Mahanadhi-Hooghli coastal province. The CMFRI is orienting some of the existing research projects towards this objective, and the results of such studies, as they emerge, would be instantly disseminated through the media for the benefit of the fishing industry.

3. The role of mariculture in the context of dwindling opportunities in the capture fisheries sector is becoming increasingly clearer to the scientific community and the industries. The Institute has an excellent record of mariculture technology development, which has witnessed a modest level of transfer to the various user groups, ranging from the small-scale traditional fishermen to the resource rich entrepreneurs. The entire coastline of the country's mainland and the islands of the Andamans and the Lakshadweep provide wide range of opportunities for the mariculture of a number of candidate species, for which indigenous technologies are available with the Institute (except finfishes). However, the essential infrasturcture for the operation of these technologies and their demonstration is available only at Tuticorin, and to a limited extent at Mandapam. More facilities are being planned for the Calicut and Vizhinjam centres and the headquarters at Cochin in the immediate future. Location testing for various mariculture practices has indicated potential farming zones along the coasts of the mainland and islands, but these efforts need to be matched with the required infrastructure at all the eleven research centres, the regional centre and the headquarters.

Efforts should be made on a priority basis to integrate small-scale mariculture with small-scale capture fisheries, and the fisherfolk motivated to adopt the technologies as integral components of their profession. Private agencies like the Fisheries Research Cell (FRC) of the Programme for Community Organisation (PCO), Trivandrum; the Marianad Fishermen Co-operatives, Trivandrum; the South Indian Federation of Fishermen (SIFE), Trivandrum; and similar active groups located in almost every major fishing centre, in the country need to be involved in this task.

Our research and development programmes need to be oriented towards fulfilling these goals within a reasonable time frame, and the SRC has the responsibility of giving proper direction to our current research projects. Considering that our major R & D responsibilities are in the two thrust areas of marine capture fisheries and mariculture, our priorities in respect of the former include stock assessment, monitoring, prediction and sustained production through a realistic regime of management, while the priorities in mariculture include technology development, upgradation, farm trials, training and transfer on a regular basis.

The Institute's achievements in regard to externally funded projects and paid consultancy services have been extremely good and we need to strengthen these programmes to help generate, refine and transfer technologies and thereby also generate increasingly larger funds to invest in the core infrasturcture of experimental/pilot hatcheries, growouts and laboratories for nutrition, disease, physiology, endocrinology and genetics research. Each centre should aspire for and work towards at least two externally funded research projects and one consultancy project in the immediate future. The Agricultural Produce Cess Fund of the ICAR, the DBT, DOD, DOE & F, DST, State Councils of S & T, State Departments of Rural Development (IRDP/TRYSEM), MPEDA, NABARD, Indian Bank etc. are some of the organisations to which we propose to submit projects for funding.

Each research centre of the CMFRI will organise monthly meets with fisherfolk, fish farmers, exporters and traders and render the required advisory services. Priority problems like shrimp disease in the farms in Tamil Nadu and Andhra Pradesh require our special attention and we need to orient our research projects suitably.

The Institute can rightly be proud of its rich contribution to the advancement of knowledge and skills in the areas of marine capture fisheries and mariculture and the related scientific, technological and technical manpower development. We have a duty to ensure continuity of this tradition.

COLOUR AND THICKNESS OF NACRE IN FOUR GENERATIONS OF INDIAN PEARL OYSTER, *PINCTADA FUCATA* (GOULD) PRODUCED IN THE HATCHERY

T.S. Velayudhan*, S. Dharmaraj, A.C.C. Victor and A. Chellam

(Tuticorin Research Centre of CMFRI, Tuticorin-628 001

Introduction

In 1973 the Central Marine Fisheries Research Institute achieved a breakthrough in the production of cultured pearls from the pearl oyster *Pinctada fucata* and in 1983 succeeded in breeding the species and producing its spat in the hatchery. The colour of the pearls produced in *P. fucata* is yellow or pinkish-yellow or white. Yellow coloured pearls are much preferred, followed by pinkish-yellow and white pearls. Besdies the colour, the thickness of the nacre in the pearl is an important factor that determines the value of the pearl. The senior author has suggested selective breeding to improve the qualities of the hatchery-produced pearl oysters in India. Based on the studies on pearl production in relation to the graft tissue in *P. fucata*, it was observed that some oysters have a single black lamellar band on the external surface of the shells and these oysters have either pinkish-yellow, yellow or white nacre. This prompted the authors to carry out selection experiments with respect to the colour of nacre in pearl production. This type of study will help to develop breeding programmes for producing pearl oysters having desired nacre colour.

The broodstock were collected from the natural stock of pearl oysters from pearl banks off Tuticorin and they formed the parent stock of the first generation. They were placed in a spawning tank, and if natural spawning did not occur, they were stimulated to spawn either by manipulating the water temperature or by adding chemicals. The spat produced from such spawning were reared. From the first generation of oysters thus obtained, only those with a single black lamellar band on the external surface of the shell valves were selected to raise the next generation and this selection continued till the fourth generation. The first to fourth generations are denoted as G-1, G-2, G-3 and G-4 respectively. The length of the oyster is expressed as dorso-ventral measurement (DVM).

Spawning protocol

The effective breeding population size has been calculated as Ne = 4 Nm Nf/(Nm + Nf), and the values were 17.68, 18.20, 32.94 and 10.18 respectively for first to fourth generations. The succeeding generation was raised from the offspring of the preceding one.

Grow-out

The pearl oyster larvae were reared in 50-litre FRP tanks with ration of the live algae, *Isochrysis galbana*. The spat were also grown in similar tanks and fed with mixed culture of live micro-algae. At 2-3 mm length they were transferred to the pearl oyster farm and reared in box-type cages of the size 40 cm × 40 cm × 10 cm, covered with 1mm mesh velon screen, at a density of 1,000 spat/cage. The cages were again covered with nylon fishing net of 1-1.5 cm mesh to protect the spat from predators. In the farm, the cages were suspended from raft moored in the Tuticorin Harbour at 5 m depth. When the spat attained 15-20 mm length they were transferred to box-type net cages (40cm × 40 cm × 10 cm) having 1 cm mesh and reared at a density of 250 spat/cage. Further rearing of oysters was continued in these cages at different concentrations according to the size of oysters: 35-45 mm oysters at the rate of 125 nos./cage, 46-55 mm at 100 nos./cage and 56-70 mm at 75 nos./cage.

The first generation (G-1) (Fig. 1 b) was raised on 23.2.1983, for which the oysters from the natural bed formed the base stock (Fig. 1a). Succeeding generations G-2, G-3 and G-4 were produced on 16.8.1984 and 22.4.1987 (Figs. 1,2,3 and 4) respectively and for this, the oysters of G-1, G-2 and G-3 were the respective parents. For studying the colour of the shell nacre, samples were collected at random from the base stock, and from G-1, G-2, G-3 and G-4. One year old oysters of 1-4 generations attained average length and valve thickness (depth when both the valves were close together) of 45.90 mm and 17.10 mm, 47.40 mm and 16.50 mm, 45.03 mm and 16.00 mm and 40.40 mm and 14.15 mm respectively. A total of 177 pearl oysters from base stock, 40 from G-1, 19 from G-2, 22 from G-3 and 20 from G-4 were examined for nacre colour. The thickness of shell nacre in the right valve was

* Present address: CMFRI, Cochin - 682 014.

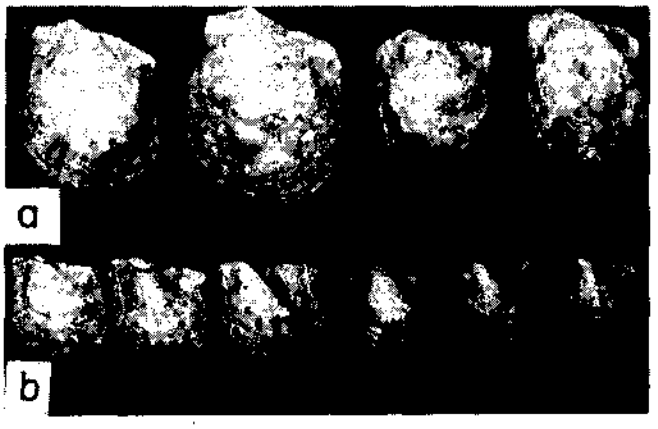


Fig. 1.a. Parent oysters collected from the wild. b. Hatchery produced oysters showing different shell characters of first generation.

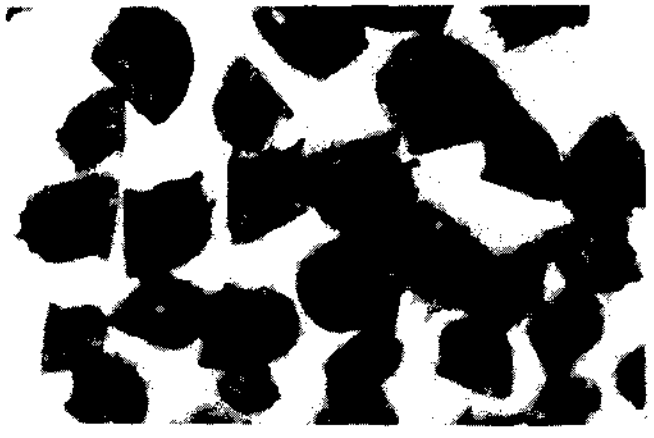


Fig. 2. Six month old oysters with black band produced from first generation (b in Fig. 1).

Fig. 3. Third generation of oyster showing inner view of right shell with nacre and outer view of left shell with black band.

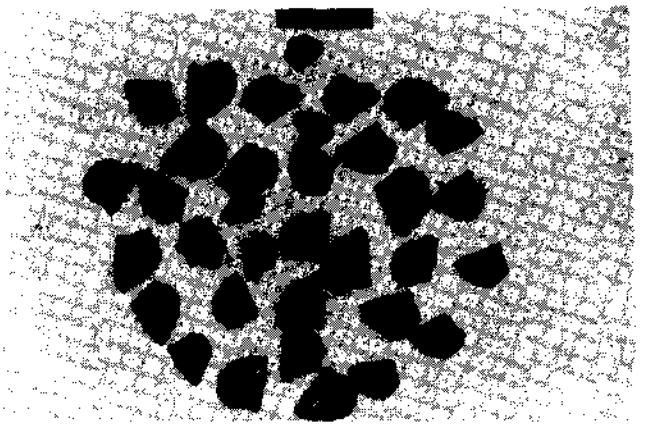


Fig. 4. One year old oyster of fourth generation with black band.

measured in the same oysters in G-2 to G-4 as for colour when the oysters attained the age of one year. After cutting the shell at area marked as 'A' (Fig. 5), the periostracum was scraped off thoroughly and the thickness of the nacre was measured with a vernier caliper corrected to 0.02 mm.

Observations

In the base population, 5% of the oysters have black band on the outer shell while in the first to fourth generations this character has been ob-

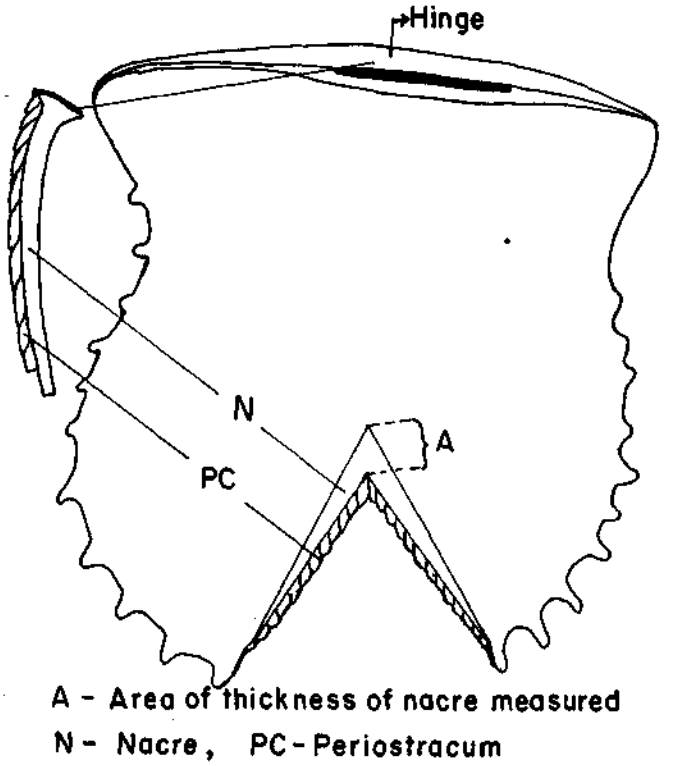


Fig. 5. Inner view of left shell of the pearl oyster cut portion (diagrammatic). A. Area measured for thickness, N. Nacre, PC. Periostracum.

TABLE 1. *Percentage of increase in the nacre colour of 4 generations of pearl oyster* Pinctada Fucata *(Gould) starting from the base population from the natural pearl oyster beds*

	Pinkish - yellow (%)					Yellow (%)					White (%)				
	Whole population examined	Selected parents	Offsprings	SR	SD	Whole population examined	Selected parents	Offsprings	SR	SD	Whole population examined	Selected parents	Offsprings	SR	SD
Natural Vs G-1	26	29.2	40	10.80	3.20	16.00	18.00	25.00	6.90	2.10	58.00	52.70	35.00	-17.70	-5.30
G-1 Vs G-2	31	40.00	31.58	-8.42	9.06	22.00	25.00	31.58	6.58	3.00	47.00	35.00	36.84	1.84	-12.00
G-2 Vs G-3	30	31.58	45.45	13.87	1.58	21.00	31.58	40.91	9.33	10.58	49.00	36.84	13.64	-23.20	-12.60
G-3 Vs G-4	33	45.45	65.00	19.55	12.45	22.00	40.91	30.00	-10.91	18.91	45.00	13.64	5.00	-8.64	-31.36
Natural Vs G-4	26	29.2	65.00	35.80	3.20	16.00	18.10	30.00	11.90	2.10	58.00	52.70	5.00	-47.70	-5.30

G-1 to G-4 (Generation 1-4), Natural (base stock from the natural beds), SR (selection response), SD (selection differential).

served in 35,70,80 and 95% of oyster respectively. Similarly the increase in the percentage of shells with pinkish-yellow and yellow has been from 29.2 to 65% and 18.1 - 30% in G1 to G4 respectively. There is a considerable increase of 35.8% in pinkish-yellow, 11.9% in yellow and a decrease of 47.7% in the white nacre in the fourth generation (Table 1). A steep increase in the percentage of thickness was observed in pinksih-yellow at 19.55 in the fourth generation followed by yellow at 9.33 in the third generation and white nacre at 1.84 in the second generation (Table 2). Thickness of the pinkish-yellow nacre in the right shell at 0.482± 0.001, yellow at 0.486 ± 0.001 and white nacre at 0.481 ± 0.028 mm was observed in the second generation. Of all the right shells examined, the highest thickness of 0.873 mm was observed in the third generation for yellow nacre (Table 2). There was a considerable decrease in the nacre thickness in the fourth generation in all the nacre colour when compared to the third generation. But the thickness of nacre was still greater than the thickness of the second generation. The percentage of oysters with pinkish-yellow and yellow nacre increased considerably from 29.2 and 18.1 in the base stock to 65 and 30% respectively in the fourth generation (Fig. 6). However, the white nacre decreased from 52.7 in the base stock to 5% in the fourth generation. The genetic correlation between the oysters with a single black lamellar band on the outer side of the shells and nacre colouration comprising, pinkish-yellow and yellow has led to the increase in their numbers in the population

TABLE 2. *Mean nacre thickness and standard deviation of one year old* Pinctada fucata *(Gould) for pinkish-yellow, yellow and white for three generations of response in each generation*

Generation		Right (flat shell) thickness in mm		
		Pinkish-yellow	Yellow	White
2.	Total	2.897	2.916	3.370
	Average	0.482	0.486	0.481
	SD	±0.006	±0.0014	±0.0282
	n (19)	(6)	(6)	(7)
3.	Total	8.705	7.864	2.606
	Average	0.870	0.873	0.868
	SD	±0.0158	±0.0389	±0.0152
	n (22)	(10)	(9)	(3)
4.	Total	6.317	2.922	0.484
	Average	0.485	0.487	0.484
	SD	±0.0103	±0.0126	—
	n(20)	(13)	(6)	(1)
	Response 3 Vs 2 %	0.388	0.387	0.387
		80.490	79.620	80.460
	Response 4 Vs 3 %	-0.385	-0.386	-0.384
		-55.680	-55.780	-44.240
	Response 4 Vs 2 %	0.003	0.001	0.003
	Parameters	0.620	0.210	0.620

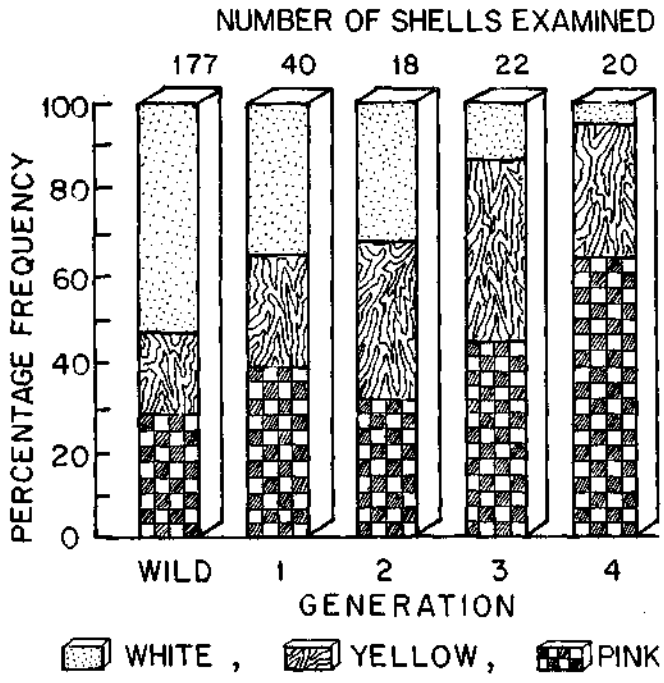


Fig. 6. Percentage frequency of nacre colour in the parents (wild) and offspring during the first year in four generations of pearl oyster.

through selective breeding of the oysters with black band on the shells.

Remarks

In the case of the Japanese pearl oyster, *Pinctada fucata martensii*, the frequency of shells with white nacre has increased to 80% in the third generation from 20% in the base population by selective breeding. In this study an increase in the percentage of thickness in pinkish-yellow (19.55), yellow (9.33) and white nacre (1.84) respectively was observed in the fourth, third and second generations respectively when compared with the first generations respectively when compared with the first generation. According to Wada (1986) the yellow coloured pearls produced from the oysters of second generation were heavier than the white ones. In the present study, the maximum thickness of nacre of yellow and pinkish-yellow colours was observed in the oysters produced in almost all generations. Based on this study it is suggested that the quality of pearls and nacre thickness of shells could be improved through selective breeding.

"DEEP-WATER RED FISH", A NEW RESOURCE FOR THE INDIAN *BECHE-DE-MER* INDUSTRY

D.B. James* and M. Badrudeen**

(Central Marine Fisheries Research Institute, Cochin - 682 014)

Introduction

The Indian *Beche-de-mer* industry is in existence for more than one thousand years. The species that are chiefly processed are *Holothuria scabra* ("Vella attai") and to a minor extent *Holothuria spinifera* ("Raja attai" or "Cheena attai") and *Bohadschia marmorata* ("Nool attai"). *H. spinifera* was once a very priced item but now it is not preferred by the industry. In recent years due to the attractive prices offered in the international market, other sea cucumbers like *Actinoypyga echinites* ("Paar attai"), *A. miliaris* ("Pal attai") and *H. atra* ("Kuchil attai") are processed in the Gulf of Mannar area. India is now earning a foreign exhchange of more than one crore of Rupees by exporting cheifly *H. scabra*.

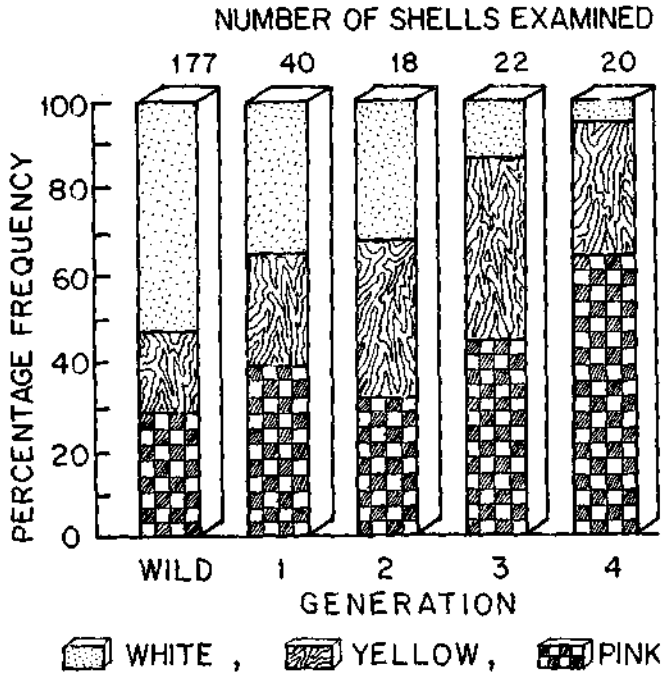
There are over 650 species of sea cucumbers known from the various parts of the world. They occur from the shore to the greatest depths and from the Arctic to the Antarctic. In the seas around India, nearly 200 species of sea cucumbers are known of which 75 species are known from the shallow waters within a depth of 20 metres. Of these about a dozen species are of commercial importance.

In 1989 for the first time *Actinoypyga echinites* (Fig. 1) known as Deep-water red fish was collected and four tonnes were processed at Keelakarai. This is considered as one of the new resources for the Indian *Beche-de-mer* industry. During 1990 this species was fished and processed from Keelakarai, Periapatnam, Vedalai and Pamban. It is locally known as "Paar attai" since it is found to be attached to Paars (rocks) in the Gulf of Mannar.

Fishery

Acutally fishery for this species started in October, '90 simultaneously both at Keelakarai and Periapattinam. The fishery was very intensive at both the places. About 125 fishermen in 12 boats

Present address: *Tuticorin Research Centre of CMFRI, 90 North Beach Road, Tuticorin-628 001.
**Regional Centre of CMFRI, Mandapam Camp-623 520.



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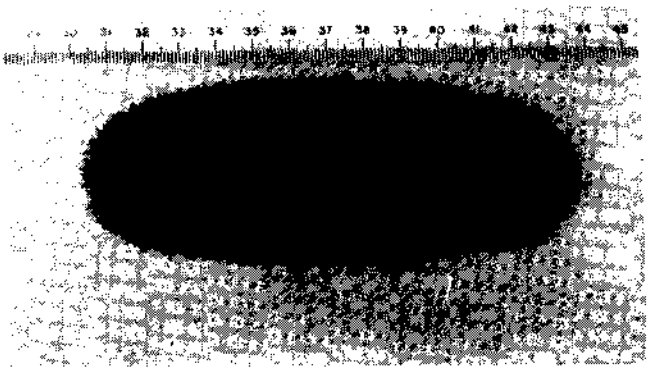

Fig. 1. Single specimen of *Actinopyga echinites* (Jaeger).

and 90 fishermen in 10 boats participated in the fishing from Periapattinam and Keelakarai respectively. Fishermen leave in the morning between 3 and 5 A.M. according to the distance of the fishing ground from their places and land their catches in the afternoon by 3 P.M. Fishing at Vedalai started very late and from Pamban still later. While two boats with 40 fishermen participated at Vedalai, only occasional collections were made at Pamban with 10-15 fishermen. Though the fishermen from Periapattinam and Keelakarai started simlutaneously, the Periapattinam fishermen suspended the fishing due to the fall in price from Rs 3.00 to 2.00 and below per specimen and again resumed in mid October, '90 with four boats. Keelakarai fishermen continued collection till the first week of December, '90. The fishing season extended from November to March during 1991, 1992 and 1993 and steadily declined due to non-availability of specimens. During 1991 and 1992 no fishing took place at Periapattinam and during 1992 and 1993 no fishing was conducted at Pamban.

Fig. 2. *Actinopyga echinites* put as a heap.

Collection is mostly done by skin diving using a mask. If the sea is clear without turbidity, collection of sea cucumbers will be good. In the first week of August the catch per fishermen was estimated to be from 150 to 250 numbers or even more. In addition to this sea cucumber *Holothuria spinifera* sea shells like *Cyprea* are also collected by them.

Fishing grounds

The fishing grounds (Fig. 1) are mostly off the chain of Islands in the Gulf of Mannar. The sea cucumbers are found on the rocky bottom which extends from the sea shore to 2-8 kilometre distance of the southern side of the islands. The depth of the fishing grounds also ranges from 3 to 7 metres. The present fishing ground extends from Nallatanni Island to Shingle Islands. Good resource was noticed from Mulli to Shingle Islands because of the rocky substratum of these islands which extends to a greater distance of 7 kilometres. At present beyond 8 metres depth diving is not carried out since visibility is poor. The resource, however, seems to be good beyond 8 metres.

Mode of disposal

As soon as the catch is landed, the entire catch or part of the catch is purchased by the processor or his agent by counting the number of sea cucumbers with each fisherman. In the beginning the price ranged from Rs. 1.50 to 3.50 irrespective of the size. The processed product was sold at the rate of Rs. 120.00 to 150.00 per kilogram to the agents. In later years the price has gone up to Rs. 5.00 to 10.00 for the raw material because of the demand of processed material and decline in the catch. Altogether 35.2 tonnes were landed during 1990-'93 from Mandapam area (Table 1). The price of the processed product has also goen from Rs. 300.00 to 450.00 per kilogram. There are two main agents at Keelakarai and one at Madras. The processed product is mainly sent to Singapore where it fetches good price.

TABLE 1. *Centre-wise landings of* Actinopyga echinites *in tonnes during 1990-'93*

Names of centres	1990	1991	1992	1993	Total
Keelakarai	12.0	1.2	0.8	0.5	14.5
Periapattinam	8.5	-	-	0.4	8.9
Vedalai	4.5	2.3	1.4	1.6	9.8
Pamban	1.5	0.5	-	-	2.0
Total	26.5	4.0	2.2	2.5	35.2

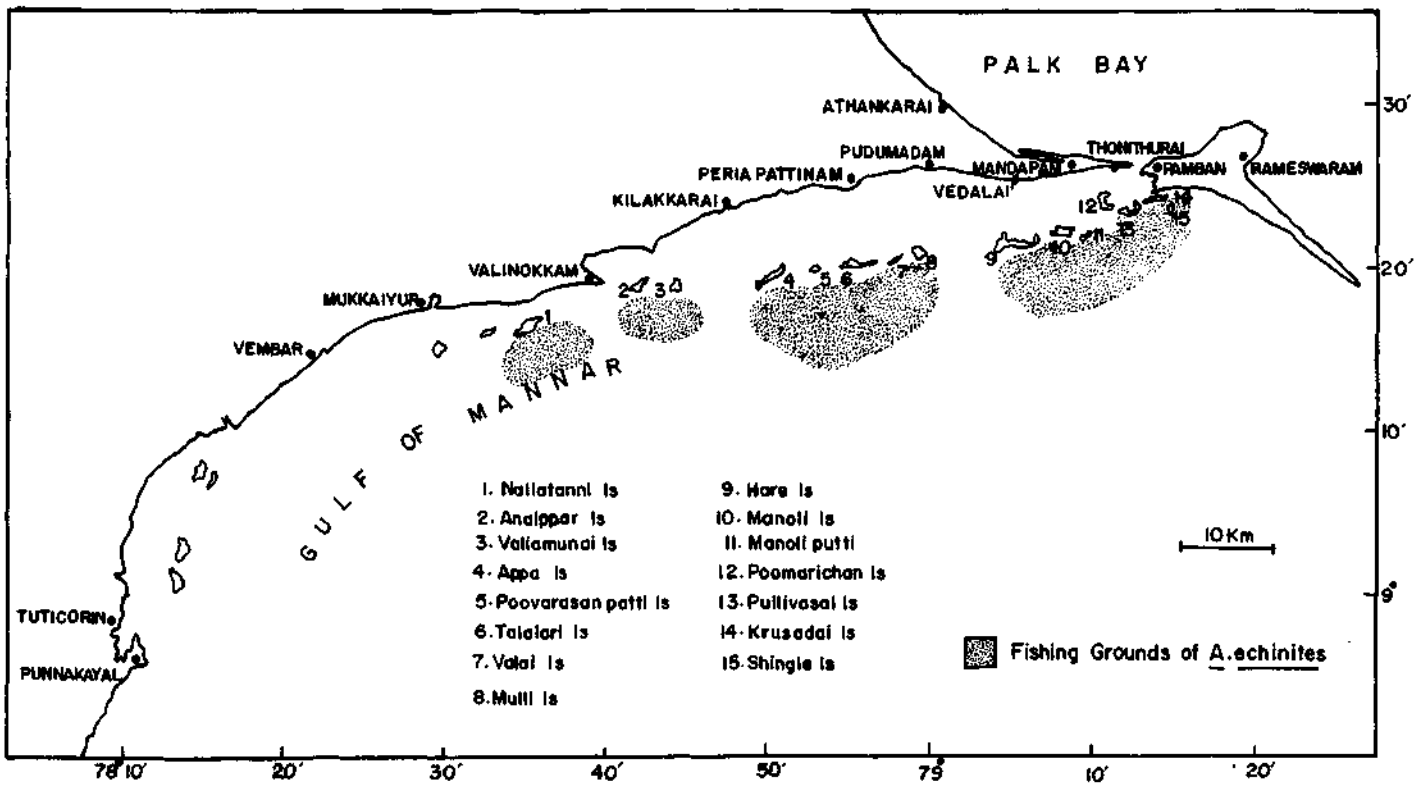

Fig. 3. Map showing the area in the Gulf of Mannar where *Actinopyga echinites* is fished at present.

Processing method

The processing method for this sea cucumber is different from that used for *Holothuria scabra*. For this species burying is not necessary after boiling. After collection, the sea cucumbers are put in a heap to allow eviceration (Fig. 2). The sea cucumbers are put in boiling sea water and boiled for half an hour. Usually 300 to 500 numbers are boiled at a time. After boiling they are heaped on the shore and covered by polythene mats. Next day morning they are first cleaned and pieces of intenstine, sticking to the body are removed. The material is put out for sun drying for four or five days depending on the size of the specimens. 25-40 numbers of processed sea cucumbers would weigh 1 kg.

The sea cucumbers ranged in length from 110 to 265 mm and the weight ranged from 140-340 g in the fresh condition. About 50% of the sea cucumbers were found to be in mature condition.

Catch statistics

During the years 1990-'93, 35.2 tonnes of *Actinopyga echinites* were fished from Keelakarai, Periapattinam, Vedalai and Pamban. Table 1 gives centre-wise landings of "Paar attai" at the four centres. Intensive fishing was noticed at Keelakarai by the fishermen almost throughout the year. These fishermen come upto Vedalai and collect the material and take the catch to Keelakarai.

PERCEPTION OF FARMERS ABOUT GROUP ACTION IN PRAWN CULTURE AND AN ACTION PLAN FOR GROUP FARMING

P. Rajeev * and Krishna Srinath

Central Marine Fisheries Research Institute, Cochin - 682 014

Prawn farming in rural sector has immense scope for improvement in terms of the practices followed and utilisation of water bodies. Studies conducted by the Central Marine Fisheries Research Institute in Ernakulam District in Kerala have revealed that there are many technological and socio-economic problems faced by farmers engaged in prawn production. These include lack

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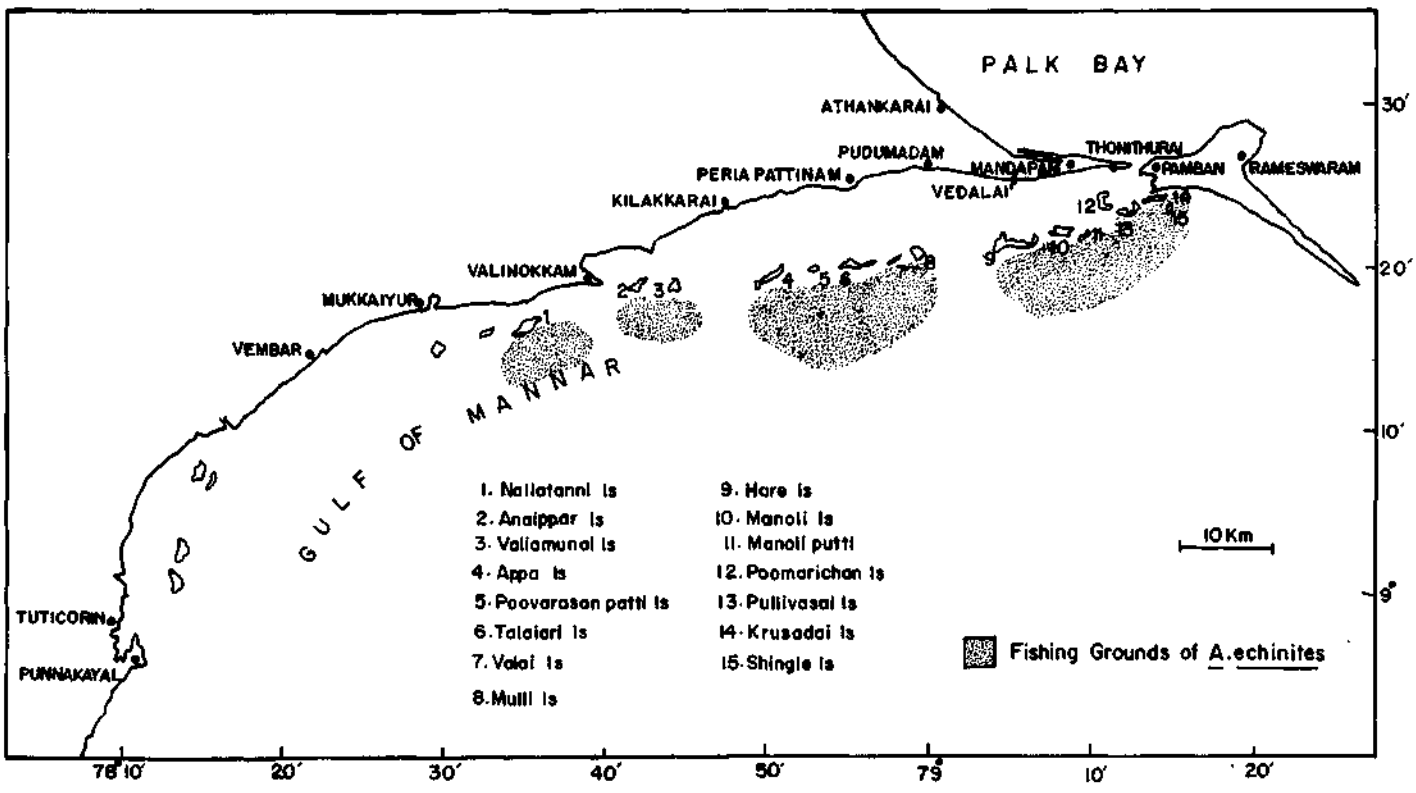

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of technical know - how, uncertainties in yield, labour problems, poaching of prawns in the fields, inter sectoral conflicts and exploitation by middlemen in marketing. With the objective of enabling farmers to learn the practices involved in scientific prawn culture and solve the constraints faced by them in the management of the enterprise, it was proposed to demonstrate the concept of group action in different farming operations among selected prawn farmers in Ernakulam District. This formed a part of the Research Project on evaluation of extension methods for fisheries development under the Socio-Economic Evaluation and Technology Transfer Division of the Institute.

The practice of group farming is of widespread existence in many enterprises in Asian countries. The concept of group management was first tried in agricultural sector. According to the reports of ESCAP and FAO Regional Planning Commission, the developing countries have shown increasing interest in popularising group farming practices. In Kerala, group farming trials conducted by FACT Ltd. in Trivandrum District and the group farming programme of paddy cultivation by the Department of Agriculture are successful examples (Heli. R. Group Farming for Rice Dvelopment in Kerala. *Dept. of Agriculture, Kerala*, 1989). These attempts have helped in solving complex socio-economic issues in agricultural sector.

Group farming in the present context refers to the farm management approach in which the prawn farmers of a contiguous area are organised to pool their land and resources. In this approach it is important that the individual farmer retains the right of ownership over the land, investment and the returns from his holdings. All the farming operations such as procurement of inputs, water mangement, eradication of pests, stocking of seed etc., are done simultaneously by the participating farmers. The technical advice can also be collectively availed. Thus management serves as a critical input and collective management forms the essence of group farming approach. In group farming, problems faced by individual farmers are eased out and solved through collective efforts.

Before launching a comprehensive programme on group farming, it is indispensable to study the reflections and opinions of the clients about the strategy which is new to them. The success of convincing the farmers on the benefits of group management and institutionalising the approach, to a great extent depends on the degree to which the clients favour such approach. In order to understand the perceptions of prawn farmers in a selected locality regarding the introduction of group farming practices and the constraints in institutionalising the approach, a study was conducted in Chellanam fishing village in Ernakulam District adopted by the Central Marine Fisheries Research Institute under its extension programmes. The prawn farmers belonging to the *padasekharams* (group of paddy fields registered as a society under the directions of the Department of Agriculture) practicing paddy-cum-prawn culture in Chellnam revenue village under Chellanam Panchayat were considered for the pilot study and a sample of sixty farmers was selected. Data on the socio-economic profile, farming practices followed, perceived benefits of group farming and the constraints anticipated, were collected using a questionnaire followed by group interviews.

Profile of the respondents

The profile of the selected respondents is as follows: Twenty five per cent of the respondents belonged to the age group of 22-30 years, 33.3 per cent belonged to the age group of 30 to 50 years and 41.7 per cent belonged to the age group of 50 years and above. Regarding education 40 per cent had primary, 38 per cent had high school and 22 per cent had higher level with technical training.

Size of holdings

Forty seven per cent of the farmers possessed 1-3 acres of holding suitable for prawn farming. Twenty two per cent of them practised prawn farming in their own holdings as well as in leased in fields. Twenty three per cent possessed holding sizes between three and five acres and the rest had above six with the maximum of 14 acres.

Knowledge and use of improved prawn farming

Thirty eight per cent of the farmers had received knowledge about improved prawn farming mainly through the training programmes conducted in the village by the Central Marine Fisheries Research Institute under its extension programmes. Ten per cent had attended the training programmes of MPEDA or BFFDA. On the use of prawn farming practices, 35 per cent of the farmers practised traditional filtration method and 60 per cent adopted supplementary stocking and feeding. Three farmers attempted selective stocking and supplementary feeding.

Perceptions of farmers about group farming approach

The perception of different aspects of group approach in prawn farming was collected from the

farmers on a three-point scale. It was observed that 64.6 per cent of the farmers had most favourable perception regarding group approach. About 23 per cent perceived the group management strategy as favourable. Only 13 per cent were having unfavourable attitude towards the proposed strategy. The perceived benefits included efficient use of resources, better contact with R & D agencies, increase in production, efficient marketing including price fixation and social benefits such as development of leadership qualities, co-operation and team spirit.

In a discussion following the collection of data the farmers subscribed to the view that collective action will be highly useful in reducing the cost of pumping water, eradication of pests and procurement of other inputs. The produce is at present marketed individually in small quantities which often forced them to sell through middlemen. Through collective action in marketing they would be in a position to demand a better price, they opined. They believed that such an approach will improve their problem solving abilities. This perception is backed by their encouraging experience from the cooperative movements such as Matsyafed and the service co-operative society in the village. The efforts put in by the Central Marine Fisheries Research Institute in organising women into *Matsyamahilavedi* and *Matsyamahila Industries* for self employment and empowerment and the prawn farmers into a forum for imparting technical know-how in prawn culture have received appreciation from the villagers. However, the farmers also anticipated the following constraints in the implementation of group management approach in the village.

1. Intra-group conflicts due to lack of mutual trust.
2. Difficulty in evoking equal participation by all members of the group.
3. Lack of support for group ventures in prawn farming.
4. Lack of conviction of farmers on the practicability of group action.
5. Practice of leasing out the holdings without following legal procedures which poses difficulty in availing credit and subsidy from the Government.

The pilot study on farmer's perception of group farming approach indicated that the positive perceptions of the farmers outweighed the constraints. Taking clues from the experiences in agriculture in the country and abroad it would be worthwhile to test and evaluate the proposed strategy among prawn farmers of a selected area and educate them on its usefulness following the principle of 'seeing is believing and learning by doing'. Group approach will also be a useful and more economic method for technology disseminating agencies in view of the resource constraints generally faced by them.

TABLE 1. *Perceived economic and social benefits of group farming*

Perceived benefit	Percentage of farmers responding in favour
Gain in knowledge through interaction with members	88.3
Efficient use of resources	86.6
Co-ordination and contact with development agencies	83.3
Better access to credit and other inputs	80.0
Better price for the produce	82.0
Procurement of technical help for implementing better farming practices	78.9
Reduction in farming cost	71.2
Leadersip development	90.0
Better co-operation and team spirit	90.0

An action plan for group farming of prawn

The concept of group farming is not new. But its application in prawn farming has not yet been demonstrated. The principles underlying the concept are:

1. The farmer holds his independant right of ownership on his holdings and the produce from them.
2. For the easy implementation of the group farming activities farmers are organised into a group which will be responsible for implementing the farming decisions made by the group in consultation with the technologists and development agencies..
3. The farmers procure the farming inputs collectively and carry out each farming operation simultaneously.

Following the above principles, a plan of action for the implementation of group action in prawn farming was prepared and discussed with the farmers which is given below.

Plan of work

1. Selection of a group of prawn fields lying contiguously in a geographical area and preparation of a field map.
2. Organising the farmers of the selected area into a functional group and convening a meeting in which objectives of the group farming will be explained.

3. Constitution of programme implementation committee consisting of president, secretary, treasurer and five to seven members representing different categories of farmers in the group through election or consensus. This commitee will make decisions regarding implementation of farming operations.

4. First meeting of the programme implementation committee and making decision regarding the species intended for farming, the procedure of procuring the inputs such as eradication materials, feed, seed etc. Farmers may prefer to use the same type of feed and seed in view of synchronising the operations and bulk purchase and transport of the inputs and procuremet of credit. It is desirable that the decisions are made in consultation with the technical experts. The practices to be followed may be identified and a calendar of farming operations may be prepared.

5. An assessment of the input requirements and the eligibility for institutional credit of each farmer may be assesed and list may be prepared by the group secretary.

6. Second meeting of the programme implementation committee to decide on procurement of inputs, the money to be collected from each farmer and meeting of concerned agencies for credit.

7. Training of the farmers in the farming practices to be followed with the help of a government agency. The farmers may be explained the details of farming operations and their sequences and the calendar of activities may be distributed to them. The training programme may be of one week duration with field visits and demonstration on different aspects of the technology. The programme should also help in clearing the doubts and anxiety of each farmer regarding his farm.

8. Commencement of farming operations by strengthening the bund and taking up other farm improvement measures.

9. Weekly meeting of the programme implementation committee to review the programme and identify constraints.

10. Fortnightly meeting of the participating farmers and the technical experts to discuss and suggest solutions to the problems faced by the farmers. The services for soil and water quality testing and monitoring of growth may be made available to the group with the help of the technical experts.

11. The treasurer will collect and maintain the day-to-day expenses incurred for implementation of the programme.

12. At the end of the programme, the president may convene a meeting of the participating farmers and the technical experts to discuss the experience of each farmer and evaluate the gains.

Thanks are due to Dr. R. Sathyadhas, Senior Scientist, SEETTD for going through the paper and suggesting improvements.

TRAINING PROGRAMME FOR FISHER-WOMEN ON PREPARATION OF FOOD FROM SEAWEED — AN EVALUATION STUDY *

Seaweed is one of the important renewable marine living resources. It includes all macroscopic algae growing in the sea and in bracksih coastal waters. They grow abundantly along the Pampan, Mandapam and Ramewsaram coasts in Tamil Nadu. Seaweeds are extensively used in the manufacture of food and medicine and in industries for the extraction of agar agar and sodium alginate. Seaweed recipes for preparing jam, jellies, wafers and pickles are available.

With the objective of extending the methods of preparation of seaweed as food which can help to increase the income generating opportunities and nutrient consumption of fishermen, a three month training programme was conducted at Rameswaram for 30 fisher-women under the "Training Rural Youth For Self Employment Scheme (TRYSEM)". This was conducted by the Centre For Women in Agriculture and Rural Development (CFWARD), a voluntary agency at Rameswaram in collaboration with CMFRI. The study was conducted aiming assessing the usefulness of the training in terms of knowledge gained, impressions of trainess and constraints involved in the utilization of the knowledge.

*Prepared by Sheela Immanuel, Regional Centre of C.M.F.R.I., Mandapam Camp - 623 520.

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Procedure

An interview schedule was made use of to gather the required information. To assess the knowledge, a knowledge test was conducted before and after training. Information was also collected on socio-economic profile of the trainees and their impressions on the programme. The training design was also evaluated for its suitability to the trainees.

Socio-economic profile of the trainees

All the trainees were between the age group of 18 and 35 years as per the norms under the TRYSEM programme. A maximum of 33% of the respondents had primary level of education followed by high school (27%) and secondary education (20%). The houses were classified as pucaa, semi-pucca, and kutcha according to the material used for the construction of wall and roof. A good majority (73%) of them owned kutcha houses and 20% had semi-pucca houses while only 7% had pucca houses. The overall profile clearly indicated low socio-economic status of the trainees. Regarding occupation, about 33% of the trainees were involved in fishery related activities and 7% in their own tea shops, while the remaining were engaged in household activities. Majority of the respondents (70%) had nuclear families with an average family size of 5.

Mass media contact

Only 37% owned radio and out of them only 13% used radio as a source of information. The fishermen were getting weather forecasting through All India Radio, but no information about fisheries was received by them. Only 3% of them possessed television and the rest could not afford to procure it. Newspaper was used by 30% for gathering day-to-day information. Literature related to fisheries/ seaweed was not used as a source of information because they were few in number and mostly written in English.

Assessment of knowledge level

The knowledge before training was assessed by administering to the respondents a knowledge test consisting of 21 questions. The knowledge level was categorised as high, medium and low based on the scores assigned.

Majority of the trainees (97%) came under the low knowledge group. Only 3% of them fell under the meidum category. This may be due to the non-availability of the information through the sources contacted.

Gain in knowledge

To assess the gain in knowledge, the same set of 21 questions were administered to the trainees at the end of the training and the scores were classified as earlier and compared with pre-training knowledge level.

After the training 57% were found to have medium knowledge, 37% high and 6% low suggesting considerable gain in the level of knowledge. Detailed and thorough knowledge about different aspects of seaweed utlization was given to the trainees using extension methods such as lectures and demonstrations.

Evaluation of the training design

The training methods and the design were evaluated in terms of the preference of venue, duration, methods and number of trainees. A maximum of 50% of the trainees preferred the research station as the venue of the training, while 37% preferred their own village and 13% preferred the nearby village. Preference of research station was due to the fact that they desired to know and see the technologies at the originating place itself.

The duration of training was an important component on which the trainees were asked to indicate their preferences and views. Fifty four per cent of the trainees preferred a training duration of one month, which would help them to thoroughly learn the skills. Forty six per cent preferred a duration of less than a month in view of the time involved in being away from home.

The success of training programmes entirely depends on the use of effective modes of commmunication. It was seen that demonstration was the most preferred (86%) method of training. Nobody preferred lecture class alone. However, while 5% preferred lecture and discussion 3% preferred discussion alone and 6% exhibition-cum-discussion.

TABLE 1. *Impression of the trainees on the utility of training*

	Number	Percentage
Gain in knowledge	30	100
Sharing of knowledge	30	100
Overall satisfaction	27	90
Practical utility	25	83
Relevance of subject	21	70
Income earning opportunities	17	57

The evaluation of the training programme indicated that the programme was very useful in imparting the knowledge regarding different aspects of seaweed utilization. The trainees felt that they could usefully practice the new ideas to imporve their nutrition as well as develop income generating activities based on it. However, the adoption of the technology mainly depends on the demand for seaweed products. Increasing the awareness of the coastal community on seaweed culture and utilization through need-based extension programme will help in expanding the employment opportunities in coastal areas.

EMERGENCE OF HAND JIGGING FOR CEPHALOPODS ALONG TUTICORIN COAST*

Cephalopods, locally known as 'Kanava' have emerged in recent times as one of the prime foreign exchange earners in India. Till late eighties the entire cephalopod landings were made by trawlers and partly by shore-seine as a by-catch. Though the hand jigging fishery has been developed during the seventies it gained its momentum during the eighties only. After witnessing its successful operation at Vizhinjam and Kanyakumari the fishermen have initiated hand jigging along the Tuticorin coast and Gulf of Mannar during the early nineties.

The common jigs which are under constant operation are 'Nangoora thoondil' and 'Disco thoondil'. The design and operation of the former have been described earlier by Prabhakaran Nair (*CMFRI Bull. No.* 37: 152-156, 1986). The latter one is a Japanese made jig (Fig. 1). These jigs are made of bakelite moulding to resemble a live shrimp which at the time of operation lures the cuttle fish/ squid. The eyes in the lure protrude like those of a live shrimp and brightly coloured feathers have also been attached on either side of the lure. The lures are brightly coloured in different shades ranging from blue, green, pink, orange, yellow and red on the dorsal surface but slightly diminished in colour on the ventral surface (Fig. 1). A small lead weight is attached to the lower part of the lure so that it maintains the jig in a proper dorso-ventral position. The pointed recurved hooks, usually numbering from 16 to 18 in two rows are attached in tail region.

The jigs are operated at depths ranging from 30 - 50 m upto a distance of 12 km from shore, since sandy bottom and areas where sea grasses grow luxuriantly are found to harbour squid and cuttle fish in good abundance, such areas are preferred by the fishermen for jigging.

Each jig is tied to nylon wire rope with length ranging from 6 to 15 m and are rolled on a wooden frame reel or spindle. Fishing is carried out both by *vallams* with 4 - 5 persons and catamarans with 3 - 4 persons. They leave the shore before sun rise and return before sun set. After reaching the fishing ground the cephalopods are spotted, then

Fig. 1. Japanese Jig.

Fig. 2. Fisherfolk with jigs and scoop net.

* **Reported by : T.S. Balasubramanian, S. Rajapackiam, H. Mohamed Kasim and K.M.S. Ameer Hamsa, Tuticorin Research Centre of CMFRI, Tuticorin, 628 001.**

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Fig. 3. Cephalopod catch kept ready for transportation.

the jigs are gently thrown towards them and are slowly drawn towards the boat. The squids and cuttle fish are attracted by the movement of the brightly coloured shrimp shaped lure and catch them, when they get hooked. They are then gently removed and lifted up with the help of a scoop net. The difference between 'Nangoora thoondil' and 'disco thoondil' is that the former one is operated with bait, and the later one is operated without bait. The 'disco thoondil' costs between Rs. 100 and 200 per piece and is available in the local market.

Fishermen belonging to Kanyakumari coast migrate to Tuticorin during cephaloped fishing season. The fishing season spreads out in two phases. First phase commences in December and ends in April - May and the second phase falls between July and September. As the fishery is lucrative, now - a - days this phenomenon has drawn many fishermen to get engaged themselves in cuttle fish fishery. This kind of fishery has spread out to other fishing villages such as Tharuvaikulam and Kayalpatnam.

An estimated 48.5 t, 22.3 t, 45.2 t and 40.1 t of cephalopods were landed during 1990, '91, '92 and '93 respectively (Table 1). More than 90% of the catch was constituted by a single species *Sepia pharonis* and the rest by *Loligo* spp. Mantle length and weight of *S. pharonis* were collected randomly at landing centre. Size of *S. pharonis* varied between 160 mm and 410 mm with dominant mode at 230 mm, 280mm, 320 mm and 370 mm (Table 2). As much as 9.8% of the cuttle fish catch composed of 280 mm size group formed the most dominant commercial size. The weight of *S. pharonis* ranged from 0.52 to 4.5 kg per specimen.

TABLE 1. *Month-wise estimated effort, catch and CPUE of cephalopods constituted mainly by* S. Pharonis *hooked in jigs during 1990-'93*

Month	1990			1991			1992			1993		
	Units	Catch (kg)	CPUE	Units	Catch (kg)	CPUE	Units	Catch (kg)	CPUE	Units	Catch (kg)	CPUE
Jan.	559	6,988	12.5	652	6,316	9.7	662	5,000	7.6	784	9,800	12.5
Feb.	627	10,713	17.1	370	3,370	9.1	852	7,884	9.2	660	4,235	6.4
Mar.	546	2,985	5.5	36	156	4.3	937	8,187	8.7	520	3,224	6.2
Apr.	198	1,130	5.7	-	-	-	540	3,456	6.4	416	1,248	3.0
May	170	1,295	7.6	-	-	-	160	736	4.6	-	-	-
Jun.	-	-	-	-	-	-	-	-	-	-	-	-
Jul.	252	5,484	21.8	-	-	-	576	3,648	6.3	-	-	-
Aug.	382	4,298	11.3	420	3,830	9.1	864	8,628	10.0	192	672	3.5
Sep.	588	10,188	17.3	600	6,840	11.4	240	600	2.5	144	1,488	10.3
Oct.	-	-	-	-	-	-	-	-	-	260	2,600	10.0
Nov.	-	-	-	-	-	-	-	-	-	788	10,290	13.1
Dec.	635	5,438	8.6	264	1,848	7.0	528	7,074	13.4	650	6,565	10.1
Total	3,957	48,519	12.3	2,342	22,360	9.5	5,359	45,213	8.4	3,866	40,122	10.4

TABLE 2. *Estimated size distribution of* S. pharonis *in percentage*

M.L. (mm)	Jan.'90	Feb.'90	Mar.'90	Apr.'90	May '90	Jun.'90	Jul.'90	Aug.'90	Sep.'90	Oct.'90	Nov.'90	Dec.'90	Total
160-169	4.1	1.7	-	-	-	-	-	-	-	-	-	-	1.2
170-179	3.9	-	1.5	-	-	-	-	-	-	-	-	-	0.9
180-189	-	4.0	-	-	-	-	-	-	-	-	-	-	1.0
190-199	4.1	-	1.0	2.6	-	-	-	-	-	-	-	3.0	1.3
200-209	7.9	1.7	2.0	3.2	-	-	0.8	1.9	-	-	-	-	2.4
210-219	4.1	2.2	1.5	5.0	1.5	-	0.8	1.9	-	-	-	8.5	2.9
220-229	-	6.1	3.0	2.5	-	-	2.6	-	1.8	-	-	8.5	3.3
230-239	11.5	7.8	11.7	9.0	10.5	-	1.6	1.6	-	-	-	10.3	7.1
240-249	4.1	6.1	5.4	8.0	1.5	-	2.4	1.9	1.8	-	-	8.5	4.6
250-259	4.1	2.2	3.9	2.6	5.3	-	9.3	5.6	8.8	-	-	4.8	5.1
260-269	4.1	8.4	8.7	7.4	5.3	-	8.4	5.6	1.8	-	-	3.0	5.6
270-279	12.0	8.3	7.2	7.6	6.9	-	11.7	3.1	1.8	-	-	4.8	7.5
280-289	15.8	10.9	17.0	8.3	12.1	-	11.6	3.8	3.6	-	-	3.0	9.8
290-299	7.9	6.5	4.5	9.0	6.9	-	10.1	3.4	3.4	-	-	2.4	5.9
300-309	-	4.4	3.9	8.2	10.5	-	4.2	7.5	3.6	-	-	8.5	4.4
310-319	4.1	7.5	9.9	10.8	1.5	-	9.3	5.0	3.6	-	-	10.9	6.8
320-329	7.7	6.2	8.3	2.5	8.4	-	13.6	4.7	7.2	-	-	6.1	7.4
330-339	-	-	3.5	2.5	4.6	-	5.1	5.3	3.6	-	-	5.4	2.5
340-349	3.9	3.8	1.0	3.2	6.9	-	1.6	6.6	3.4	-	-	6.1	3.9
350-359	-	1.7	2.0	2.5	1.5	-	2.6	8.1	7.0	-	-	-	2.1
360-369	-	2.2	1.0	2.6	1.5	-	2.6	10.0	5.2	-	-	3.0	2.8
370-379	-	4.0	1.0	-	5.3	-	0.8	11.5	13.9	-	-	-	4.2
380-389	-	2.2	-	2.5	3.1	-	-	3.4	10.5	-	-	3.0	2.9
390-399	-	1.7	2.0	-	3.1	-	-	3.4	8.6	-	-	-	2.2
400-409	-	-	-	-	3.1	-	0.8	3.8	10.3	-	-	-	2.0
410-419	-	-	-	-	-	-	-	1.9	-	-	-	-	0.1
Sample Nos	25	49	48	36	31	-	65	58	41	-	-	36.0 (389)	

Cuttle fish were procured right at the landing centre by the processing companies. They were sold at the rate of Rs.28/kg, Rs. 42/kg, Rs. 60/kg and Rs. 72/kg during 1990, '91, '92 and '93 respectively. However, *Loligo* spp, do not fetch such high prices and it varied from Rs.8/kg, Rs.12/kg, Rs. 15/kg Rs.20/kg respectively during the same period.

The present observation reveals the emergence of a new fishery for cephalopods along the Tuticorin Coast. In contrast to the cephalopod catch by trawl net the present exploitation by jigs is highly selective and brings in large sized cuttle fish belonging to one species. Further, it is caught only during day time. Night fishing with the necessary facilities may enhance the cephalopod production in future.

THE INSHORE MIGRATION OF BUCCANEER ANCHOVY DURING MONSOON*

Whitebaits which form one of the important commercial pelagic fishery resources of the southwest coast of India, are generally inshore schooling species. But the Buccaneer anchovy, *Encrasicholina punctifer (=Stolephorus buccaneeri)* is comparatively an oceanic species which migrate to inshore waters during the southwest monsoon period (June - September). During the other months, this species is available only in stray numbers in the inshore catches. This species is the suitable anchovy which could be employed as live-bait and hence has special importance as a potential live-bait for tuna in Lakshadweep.

A large scale inshore migration of this species resulted in heavy landing of the fish by boat seine during 19 - 22 July '94 at Vizhinjam. The catch details of the boat seine during the four days are given in Table 1.

It could be seen that the total whitebait catch during the four days was 222.7 t which constituted 94.8% of the total fish catch by boat seine. *E. punctifer* formed 83.6% and *E. devisi* 11.2% of the catch. The catch per unit effort of *E. punctifer* in motorised and non-montorised boat seine units were 230.8 kg and 134.6 kg respectively.

TABLE 1. *Catch details of the boat seine from 19th to 22 July '94 at Vizhinjam*

Species/Group	Boat seine catch in kg		Total	%
	Motorised craft	Non-motorised craft		
Encrasicholina punctifer	1,67,576	55,172	2,22,748	83.6
E. devisi	19,468	10,335	29,803	11.2
Decapterus macrosoma	406	420	826	0.3
Trichiurus lepturus	1,292	160	1,452	0.5
Rastrelliger kanagurta	6,636	3,694	10,330	3.9
Carangids	-	160	160	0.1
Loligo duvauceli	895	160	895	0.3
Acetes	-	392	392	0.1
Total	1,96,273	70,333	2,66,606	
Effort expended	726	410		

The monsoon was very active and the surface water temperature came down from 24.5°C to 22.5°C during these days.

E. punctifer ranged in total length from 55 to 119 mm with modes at 70 and 100 mm. The major portion of the catch was contributed by 100-109 mm fish. Among females 71% and among males 95% of the fish were in partially spent gonadial condition. It is known that the spawning season of this species is protracted and the monsoon season also forms part of the spawning period of the fish. In the samples collected, 95.6% of the fish were with 'empty' and the rest were with 'half full' stomach condition. The stomach contents consisted almost entirely of the copepod, *Temora turbinata*. However, it needs further investigation to establish whether the migration of *E. punctifer* is associated with feeding or in accordance with the environ- mental changes.

Eventhough, the inshore migrated population of *E. punctifer* during monsoon can be termed as a spawning stock, it is seen that the majority of the fish had almost reached their maximum size. Added to that, the spawning season of the fish also is protracted. Hence the exploitation of the inshore stock during monsoon may not adversely affect the recruitment pattern. In view of the above, it is felt that if this species is not judiciously exploited from the inshore waters during the monsoon months, it will be almost entirely lost to the artisanal fishery. Experiments carried out at Vizhinjam had shown that this species could be kept in pens without much mortality for about three months. It is worth investigating whether the species could be stocked in pens during the monsoon period for two to three months and then transported to Lakshadweep for utilisation as live-bait for tuna.

*** Prepared by G. Gopakumar, R. Bhaskaran Achary and A. K. Velayudhan, Vizhinjam Research Centre of C.M.F.R.I. Vizhinjam - 696 521**

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A BLUE WHALE *BALAENOPTERA MUSCULUS* LANDED AT MANGAMARIPETA, NORTH OF VISAKHAPATNAM *

A live male Blue whale *Balaenoptera musculus* Linnaeus locally called "papper meenu" measuring 12.17 m in total length was entangled accidentally on 9th May 1994 in a synthetic drift gillnet operated by a mechanised-cum-sail craft at a depth of 50 metres off Mangamaripeta which is situated 12 km north of Visakhapatnam. The fishermen towed the Blue whale to the Mangamaripeta marine fish landing centre.

Fig.1. The Blue hale, *Balaenoptera musculus* on the beach at Mangamaripeta.

The details of morphometric measurement (in cm) are given below

Total length (tip of upper jaw to tip of caudal fin	...	1217
Tip of upper jaw to notch of caudal fluke	....	1173
Tip of upper jaw to origin of dorsal fin	....	772
Breadth of the dorsal fin base	....	57
Length of the dorsal fin	....	52
Tip of upper jaw to anterior insertion of flipper	....	350
Length of flipper	....	168
Length at base of flipper	....	111
Maximum breadth of flipper	....	49
Tip of upper jaw to bifurcation point of lower jaw	....	234
Length of upper jaw	....	244
Length of lower jaw	....	276
Tip of upper jaw to centre of blow hole	....	194
Breadth of blow hole	....	17
Tip of upper jaw to centre of eye	....	230
Eye diameter	....	15
Tip of upper jaw to centre of genital slit	....	804
Tip of upper jaw to centre of anus	....	857
Distance between origin of anus and caudal fluke	....	335
Distance between anus and genital slit	....	82
Body circumference at the anterior side of flipper	....	473
Body depth at head region	....	206
Circumference at tip of snout	....	57
Circumference at origin of dorsal fin	....	440
Circumference at origin of flipper	....	662
Circumference at origin of genital slit	....	438
Circumference at origin of anus	....	376
Height of body	....	246
Distance between extremities of caudal fluke	....	266
Length of genital organ	....	103
Estimated weight (tonnes)	....	15
Sex	....	Male
No. of throat grooves	....	85
Length of flipper in total length	....	1:7

Information on the capture/stranding of Blue whale along the Indian coasts is given in Table - 1.

TABLE 1. *Strandings/capture of blue whale* Balaenoptera musculus *Linnaeus along the Indian coasts*

Sl. No.	Date of stranding/ capture	Place	Total length of the specimen and sex	Reported by	Reference
1.	25-5-1966	Calicut	13.51 m	G. Venkataraman and K.G. Girijavallabhan	*J. mar. biol. Ass. India*, **8** (1 & 2) : 373 - 374, (1966)
2.	20 - 12-1976 (Stranded)	Off Ovari, Gulf of Mannar	6.35 m (Female)	R. Marichamy, M.E. Rajapandian and A. Srinivasan	*J. mar. biol. Ass. India*, **26** (1 & 2) : 168 - 170 (1984)
3.	31-9-1985 (Stranded)	Chappa beach, Narakkal, Cochin	10.30 m (Male)	K. V. Somasekharan Nair and A. A. Jayaprakash	*Mar. Fish. Infor. Serv., T & E Ser.*, No. 71 : 17-18, (1987)
4.	10-12-1988 (Washed ashore)	Motupalli Prakasam District, Andhra Pradesh	15.16 m (Male)	T. Chandrasekha Rao and A. Hanumantha Rao	*Mar. Fish. Infor. Serv., T & E Ser.* No. 102 : 13-16, (1989)
5.	2-5-1993 (Stranded)	Chellanam, Cochin	26 m	P.S.B.R James, N.G. Menon and N.G.K. Pillai	*Mar. Fish. Infor. Serv., T & E Ser., No. 122 : 23-24*

* **Prepared by G. Mohanraj, M. V. Somaraju and C. V. Seshagiri Rao, Visakhapatnam Research Centre of CMFRI, Visakhapatnam - 530 003.**

ON THE BUMPER CATCH OF BALISTIDS FROM TUTICORIN WITH NOTES ON LENGTH - WEIGHT RELATIONSHIP AND GUT CONTENTS*

The Leather jackets (Balistids) locally known in Tamil as 'Klaathi', normally do not form a fishery along Tuticorin coast. Though, very often they constitute a portion of the by-catch of trawl net they are thrown back into the sea by the fishermen mainly because of poor demand in the market and also for want of space on board for storage. Of late, the dry fish merchants have found a market for Balistids and started buying them. The trawl operators have been able to realise some income from the sale of Balistids.

During the second week of July 1993 a few trawlers landed Balistids as the catch of other commercially important varieties was very poor. Consequent to the scarcity of economically important food fishes and also the usual trash fishes which are locally known as 'Kalasal', a few fish merchants showed interest to bid in the auction of the Balistids, with an intension to explore the possibility of using them as a raw material for fish meal manufacture. These merchants were successful in introducing the unpalatable Balistids as a source of raw material for fish meal preparations, though it takes 3 days to get it dried perfectly whereas the other trash fish ('Kalasal') take only a day for drying.

The number of trawl net units varied from 130 to 160 during July '93. Out of the estimated 3,969 units of trawlers, only 680 units were estimated to have landed the Balistids. The catch amounted to 303.5 t at the catch rate of 446.4 kg/unit (Fig. 1) constituting 31.9% of the total trawl landings. Amidst regular Balistid landing during July '93 heavy landings were observed on certain days (Table 1) .

The Balistids were auctioned and the rate varied from Rs.16 to 20 per basket, weighing approximately 20 kg. Depending on the quantum of landing, the catch was transported to fish curing yards either by tricycle or pick-up-vans, dried and marketed.

Three species, *Balistes niger* (Shaw) (Fig 2) *Odonus niger* (Rupell) (Fig 3) and *Balistes capistratus* (Shaw) (Fig 4) constituted 89.5%, 8.6% and 1.9% of the Balistid fishery respectively. Samples of

Fig. 1. A portion of Balistid catch stored on board.

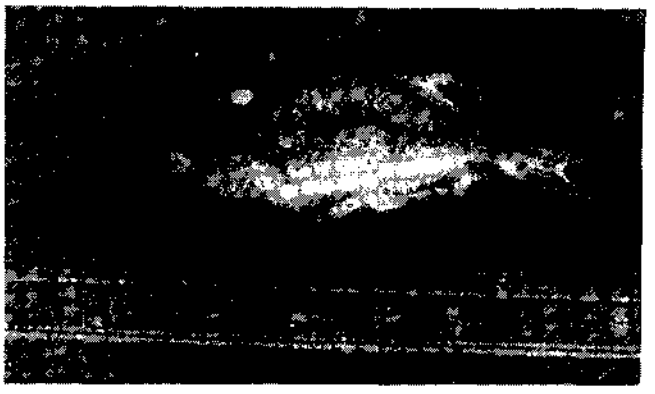

Fig. 2. *Odonus niger.*

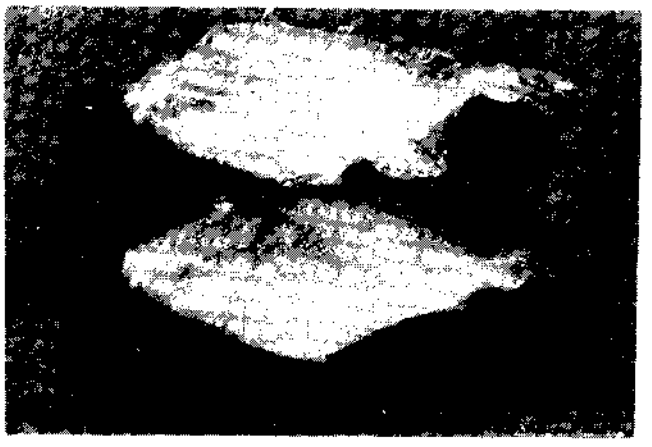

Fig. 3. *Balistes capistratus.*

* **Reported by : T. S. Balasubramanian, S. Rajapackiam, K. M. S. Ameer Hamsa and H. Mohamad Kasim, Tuticorin Research Centre of CMFRI, Tuticorin, 628 001.**

Balistids were obtained at random and detailed analyses were carried out in the laboratory on the size range, length-weight relationship, gut contents and stages of maturity of gonads. The size of *B. niger* ranged from 125-129 to 160-164 mm with a single mode at 145 - 149 mm suggesting a single brood stock having been recruited into the fishery. The second dominant species *O.niger* exhibited a size range from 120 - 124 mm to 180 - 184 mm with two modes at 130 - 134 and 145 - 149 mm, and the size of *B. capistratus* varied from 140 - 144 mm to 210 - 214 mm with two dominant modes at 160 - 164 and 185 - 189 mm indicating a possible recruitment of two brood stocks in the fishery at two different time in these two latter species.

A sample containing 100, 80 and 40 specimens of *B. niger*, *O. niger* and *B. capistratus* respectively were cut opened and stages of maturity of gonads were studied. Almost all the specimens of these 3 species were observed to be in indeterminate condition.

The length-weight data were used in regression analysis to study the length - weight relationship. The regression equation which describes the length-weight relationship of these 3 species are as follows:

B. niger : Log W = -4.0783 + 2.7526 Log L (r = 0.9271)

O. niger : Log W = -4.0474 + 2.7376 Log L (r = 0.9725)

and *B. capistratus* : Log W = -3.3741 + 2.4357 Log L (r=0.9729)

The gut content study revealed that the alimentary tract in these fishes is deeply convoluted from the oesophagus to anus. The stomach and the pyloric caeca are absent.

B . niger : The total number of specimens examined were 40 in the sizes range of 125 to 160 mm and weight from 55 to 105 g. This fish mainly feeds on small fishes which was revealed by the presence of fish flesh bits with vertebrae in the digestive tract. The contents also consisted of digested matter with molluscs (bivalves and gastropods), tentacles of *Sepia* spp., crab appendages (chela and legs) and coral stone particles.

O. niger: 25 fishes ranging from 120 to 180 mm in length and 45 to 145 g in weight were examined. In all the fishes only amphipods were present in the intestine in a semi-digested condition.

B. capistratus : Only 10 fishes of this species measuring between 140 and 210 mm and weighing 70 to 180 g were examined. The food contained tentacles of *Sepia* spp. and black coloured fine mud particles.

The volume of food contents in these three species varied from 0.40 to 1.00 ml.

Present production of Balistids by trawl net is mainly used for fishmeal manufacture. Balistids of larger size landed by hooks & line and drift gill nets are being sold for human consumption in internal markets. A suitable processing method of removing the skin and making it ready for fresh consumption may command a market for small sized Balistids also.

TABLE 1. *Details of Balistid landings during July 1993 (in kg)*

Centre: Tuticorin Fishing Harbour,	Period: July '93.			Gear: Trawl		
Date	Effort No. & Unit	*B. niger*	*O. niger*	*B. capistratus*	Total catch	CPUE
13.7.93	10	12,800	280	-	13,080	1,308.0
14.7.93	15	25,600	2,380	160	28,140	1,876.0
15.7.93	18	16,140	840	80	17,060	947.7
16.7.93	20	14,500	320	40	14,860	743.0
23.7.93	52	17,250	1,500	120	18,870	362.8
24.7.93	80	38,320	3,160	340	41,820	522.8
26.7.93	58	26,400	1,280	110	27,790	479.1
27.7.93	48	15,500	700	30	16,230	338.1
Total	301	1,66,510	10,460	880	1,77,850	590.8

ON THE LARGEST SUNFISH *MASTURUS LANCEOLATUS* LEONARD RECORDED AT PERIAPATTINAM, GULF OF MANNAR*

Sunfishes of the family Molidae are purely oceanic species of the warm and temperate seas having a restricted distribution. Though not common along the Indian coast, the occurrence of some of the species like *Ranzania truncata, R. typus, Mola mola, Masturus oxyuropterus* and *M. lanceolatus* have been reported from Indian waters. Recently a sunfish *Masturus lanceolatus* measuring 1535 mm of total length has been reported from Tuticorin . (*Mar. Fish. Infor. Serv., T & E Ser.*, No. 128 : 16-17)

On 23.01.1994 a specimen of *Masturus lanceolatus* measuring 1830 mm was found floating in the sea and was brought to Periapattinam fish market. This fish was in fresh condition without any damage or injuries on the body. The body was oval in shape with dark grey colour and the skin was rough with minute denticles. The snout was rounded with a terminal mouth. The dorsal and anal fin lobes were entire and continuous with the caudal fin gradually tapering. The fins were almost dark to dark grey in colour. Incidently, this was the largest sunfish species ever recorded from the Indian waters. The important morphometric measurements taken are given in Table 1.

Since the flesh was soft and unpalatable, the fish was buried later.

TABLE 1. *Morphometric measurements (in mm) of sunfish* Masturus lanceolatus *landed at Peripattinam*

Total length	1830
Standard length	1542
Snout length	180
Head length	430
Height of body	870
Eye diameter	64
Height of dorsal fin	620
Height of anal fin	570
Height of pectoral fin	200
Length of eye to pectoral fin	230
Weight (approximate)	75 kg

***Reported by : M. Badrudeen, Mandapam Regional Centre of CMFRI, Mandapam Camp - 623 520.**

UNUSUAL LANDING OF CATFISH BY PURSE SEINE AT MALPE, DAKSHINA KANNADA*

For the last several years, cat fish did not form a fishery at Malpe in Dakshina Kannada in Karnataka. On 30-09-94, three purse seines landed about 3 tonnes of catfish along with 2.2 tonnes of shark, 1 tonne of *Rachycentron* spp. and 0.65 tonne of Seer fish (*Scomberomorus commerson*). All the three units operated at a depth of 36 metres off Malpe. The catfish catch was comprised of *Tachysurus serratus* (90%) and *T. dussumieri* (10%).

The fish was sold at an average price of Rs. 105/- per fish earning a total amount of Rs. 1,31,050. At Malpe 24.5 tonnes of catfish is reported to have been landed by purse seine in the previous week also.

Catch details of the purse seine which landed catfish on 30.09.'94 and revenue (in Rs.) earned.

	Catfish	Shark	*Rachycentron*	Seerfish	Total
Wt.(t.)	3.0	2.2	1.0	0.7	6.9
Nos.	430	550	112	162	1,254
Value	45,150	44,000	22,400	19,500	1,31,050

*** Reported by S. Kemparaju, B. Shridhara, H. S. Mahadevaswamy and P. U. Zacharia, Mangalore Research Centre of C.M.F.R.I. Mangalore - 575 001.**

Erratum

The author names in Article 5 of MFIS 134, Nov. 1994, p. 27 may be read as follows :

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स्फुटनशाला में उत्पादित भारतीय मुक्ता शुक्ति *पिंक्टाडा फ्यूकाटा* (गोल्ड) के रंग और नेकर के घनत्व पर अध्ययन

वेलायुधन टी. एस, धर्मराज एस, विक्टर ए.सी.सी और ए. चेल्लम,
सी एम एफ आर आइ का टूटिकोरिन अनुसंधान केन्द्र, टूटिकोरिन

सारांश

मान्नार खाडी के प्राकृतिक तटों से संग्रहित मुक्ता शुक्ति का एक बैच से चार आनुक्रमिक पीढी का विकास किया गया। प्रत्येक पीढी के प्रजनन में कवच के बाहरी भाग में कृष्ण पट्टीवाली मुक्ता शुक्ति का चयन किया था। प्रत्येक पीढी में माने एक से लेकर चार तक कृष्ण पट्टीवाली शुक्ति का प्रतिशत यथाक्रम 35,70,80 और 95 था। चयन ने पिंक-पीला और पीला नेकर पालिवाली शुक्ति के वर्धन केलिए सहायता की है। इनके नेकर कवचों के घनत्व में भी विचारणीय वृद्धि हुई थी। नकेर रंग में सब से अधिक वृद्धि चौथी पीढी में पिंक-पीले रंग में दिखाई पडी; यह 35.8% थी। पीले रंग की प्रतिशत वृद्धि 11.9% थी। सफेद रंग में घटती की प्रवणता दिखाई पडी, घटती 47.7% थी। नकेर के घनत्व में भी वृद्धि हुई थी। दूसरी से तीसरी पीढी में पिंक-पीला नेकर का घनत्व में 79.62%, पीले में 80.4% और सफेद नेकर में 80.46% की बढती हुई।

भूमिका

मुक्ता शुक्ति *पिंक्टाडा फ्यूकाटा* से संवर्धित मोतियों के उत्पादन करने में वर्ष 1973 में सी एम एफ आर आइ ने सफलता प्राप्त की। वर्ष 1983 में संस्थान ने इस जाति का प्रजनन करके स्फुटनशाला में इसके स्पाटों का उत्पादन किया। *पी. फ्यूकाटा* से उत्पादित मोतियों का रंग पीला, पिंक - पीला या सफेद था। इन में सब से अधिक माँग पीले रंग की मोतियों को था। पिंक-पीला और सफेद मोती यथाक्रम माँग में नीचे थी। रंग के सिवा मोती का मूल्य बढानेवाला दूसरा मुख्य घटक नेकर का घनत्व है। वेलायुधन (1987) ने स्फुटनशाला में उत्पादित भारतीय मोतियों की गुणता बढाने केलिये चयनात्मक प्रजनन (selective breeding) सिफारिश किया। ग्राफ्ट टिश्यू के ज़रिए *पी. फ्यूकाटा* में मोती संवर्धन पर चलाए अध्ययन में वेलायुधन आदि (1995) ने देखा कि कुछ शुक्तियों के कवच में सिंगल ब्लाक लामेल्लार बान्ड (single black lamellar band) होते है। ऐसी मुक्ताओं में पिंक-पीला, पीला या सफेद नेकर होता है। इस निरीक्षण ने नेकर रंग के चयनात्मक अध्ययन केलिए प्रेरणा दी जिसकी विजय पर वर्धित रंग की मोती का उत्पादन कर सकता है।

प्रजनन रीति

प्राकृतिक संस्तरों से शुक्तियों का संग्रहण करके अंडजनन टैंकों में पालते है। यदि इनके प्राकृतिक अंडजनन नहीं होते हैं तो इनके प्रेरित अंडजनन किया जाता है। ऐसे अंडजनन से मिले स्पाटों का पालन करते हैं। यह पहली पीढी है। इस पीढी से सिंगल ब्लाक लामेल्लार बान्डवाला शुक्तियों को अगली पीढी के प्रजनन केलिए चुन लेती हैं। इस प्रकार अगली चार पीढियों तक चयन और अंडजनन किया जाता है। एक से लेकर चार तक की पीढियों को यथाक्रम जी 1, जी 2, जी 3 व जी 4 नाम से अभिहित करता है।

प्रजनन सूत्र

संकलन के अनुसार कार्यकारी प्रजनन जीवसंख्या आकार (effective breeding population) है NE = 4 Nm Nf / Nm + Nf और मूल्य (Values) पहली से चौथी पीढी तक यथाक्रम 17.68, 18.20, 32.94 और 10.18 थे।

बढाने की रीति

मुक्ता शुक्ति डिंभकों को 50 लिटरवाले एफ आर पी टैंकों में डालकर उन्हें *आइसोक्रसिस गालबाना* नामक शैवाल से

खिलाते हैं। स्पाटों का भी पालन उसी प्रकार के टैंकों में सूक्ष्म शैवालों के मिश्रित भोज्य देकर करते है। ये 2.3 मि मी लंबा होने पर मुक्ता शुक्ति खेतों में इसकेलिए निर्मित पंजरों में डालकर पालन करते हैं। पंजरों को टूटिकोरिन बन्दरगाह में 5 मी गहराई में लंगर किये गये रैफ्टों में लटकाये जाते है। पंजरों की रूपाकृति 40 से मी × 40 से मी × 10 से मी है। शुक्तियों के आकार के अनुसार प्रत्येक पंजर में पालनेवाली शुक्ति की संख्या निश्चित करती है। उदाहरण केलिए 35-45 मि मी वाली 125 शुक्तियाँ 46-55 मि मी वाली 100 शुक्तियाँ और 56-70 मि मी वाली 75 शुक्तियाँ पंजरों में पालने का मानक सान्द्रता है।

पहली पीढी का जनन 23.2.1983 को हुआ था। दूसरी पीढी जी 2 का 16.8.1984 को, तीसरी पीढी जी 3 का 15.2.86 को और चौथी पीढी जी 4 का जनन 22.4.87 को हुआ था। कवच नेकर पर चलाये अध्ययन ने व्यक्त किया कि सभी चार पीढियों की मुक्तियों ने एक वर्ष की आयु में औसत बढती प्राप्त की थी। औसत लंबाई 1-4 पीढी तक यथाक्रम 45.90 मि मी, 47.40 मि मी, 45.03 मि मी व 40.40 मि मी थीं। औसत वाल्व थिकनेस (valve thickness) चौथी पीढी तक यथाक्रम 17.10 मि मी, 16.50 मि मी, 16.00 मि मी, 14.15 मि मी थे।

निरीक्षण

मूल वर्ग (base population) के 5% में काली पट्टी दिखाई पडी तो 1 से लेकर 5 तक की प्रजनित पीढी के 95% मोतियों में बाहरी कवच में काली पट्टी दिखाई पडी। इसी प्रकार जी 1 से लेकर जी 4 की पीढी में आने पर पिंक - पीले रंग वाले कवचों में 29.2 से 65% और पीलेवाले कवचों में 18.1 से 30% की बढती दिखाई पडी। पिंक-पीले नेकर में 35.8%, पीले नेकर में 11.9% बढती और सफेद नेकर में 47.7% घटती चौथी पीढी में दिखाई पडी। नेकर घनत्व में पहली पीढी से चौथी में पहूँचने पर पिंक-पीले रंग में 29.2 से 65% और पीले नेकर में 18.1 से 30% की बढती दिखाई पडी। यह भी देखनेलायक था कि चौथी पीढी की तुलना में तीसरी पीढी में सभी नेकर रंगों का घनत्व ज्यादा था। सफेद रंग वाली नेकर के घनत्व में विचारणीय घटती दिखाई पडी। यह घटकर 52.7 से 5% हो गया।

परिचर्चा

जापानी वैज्ञानिक वाडा द्वारा 1986 में जापानी मुक्ता शुक्ति *पिंक्टाडा फ्यूकाटा* पर चलाये चयनात्मक अध्ययन में सफेद नेकरवाले शुक्तियों में मूल वर्ग से चौथी पीढी में 20 से 80% वृद्धि अंकित की थी। वर्तमान अध्ययन में चौथी, तीसरी और दूसरी पीढी में पिंक-पीला, पीला और सफेद नेकर के घनत्व में यथाक्रम 19.55%, 9.33% और 1.84% बढती दिखाई पडी। वाडा के अनुसार दूसरी पीढी की शुक्तियों से उत्पादित पीला मोती का भार सफेद मोती की तुलना में ज़्यादा था। वर्तमान अध्ययन में पिंक-पीला और पीला रंग के घनत्वपूर्ण नेकर सभी पीढियों में मौजूद थे। अध्ययन से व्यक्त होता है कि मोती की गुणता और नेकर के घनत्व का वर्धन चयनात्मक प्रजनन से संभव है।

गहरा सागरीय लाल मछली से बेश-द-मेर का निर्माण*

भारत का बेश-द-मेर उद्योग एक हज़ार वर्ष पुराना है। फिर भी इस उद्योग की विचारणीय प्रगति नहीं हुई है। इसका कारण इस जाति की सभी मछलियों का संसाधन नहीं होना है। हाल के वर्षों तक मूलत: *होलोथूरिया स्काब्रा* और छोटे पैमाने पर *भोडास्किया मरमोरटा* व *होलोथूरिया स्पिनिफेरा* का संसाधन होते थे। इन दिनों माँग ज्यादा होने पर *अक्टिनोपइगा इकिनिटिस, ए. मिलियारिस* व *एच. अट्रा* का संसाधान मान्नार खाडी में कर रहे हैं। इन जातियों के मूलत: *एच. स्काब्रा* के निर्यात से देश एक करोड से अधिक विदेशी मुद्रा कमाते हैं।

विश्व के कई कोनों से आज तक समुद्री ककडियों की 650 जातियों पर रिपोर्ट मिली है। समुद्र के उथले और गहरे क्षेत्रों व उत्तर ध्रुवीय और दक्षिण-ध्रुवीय क्षेत्रों में इनकी बसती होती हैं। भारत के निकटवर्ती समुद्रों में इनकी 200 जातियाँ बसती है, इनमें 75 जातियाँ उथले पानी में रहनेवाली हैं। इन में से एक दर्जन जातियाँ वाणिज्यिक दृष्टि से महत्वपूर्ण हैं।

वर्ष 1989 में पहली बार *अक्टिनोपाइगा इकिनिटिस* का संसाधान किया था। वर्ष 1990 में इसका संसाधन किलक्करै, पेरियपट्टनम, वेदालै, पाम्बन आदि समुद्रवर्ती प्रदेशों में किया था। भारत के बेश-द-मेर उद्योग में यह एक नई संपदा है।

मात्स्यिकी

किलकरै और पेरियपट्टनम में 90 अक्तूबर अनुकूल पकड का समय था। यहाँ 125 मछुए 12 बोटों में और 90 मछुए 10 बोटों में मत्स्यन में लगे थे। वेदालै में 40 मछुए 2 बोटों में और पाम्बन में 10-15 मछुए मत्स्यन में लगे थे। वर्ष 1991, 92, 93 के दौरान नवंबर से मई तक अच्छी पकड मिली थी। 1993 से पकड में मछली की लभ्यता कम होने लगी।

मछली का संग्रहण स्किन डाइविंग से करता है। पानी स्वच्छ होने पर एक मछुआ दिन में 150 से 250 ककडियों का संग्रहण कर सकता है।

मत्स्यन तल

समुद्री ककडियाँ समुद्र के पथरीले संस्तरों में रहती हैं। मत्स्यन 3 से 7 मीटर गहराई में करता है। इस से अधिक गहराई में गोचरता कम होने से मत्स्यन नहीं किया जाता है।

पकड का निपटान

संसाधक इन्हें गिनकर कुल संख्या को पैसे देते हैं। प्रत्येक ककडी को 1.50 रु. से 3.50 रु. तक का दाम मिलता है। संसाधित उत्पाद को प्रति कि ग्राम पर 120 से 150 रु तक का दाम मिलता है। इन दिनों कम पकड और ज़्यादा माँग होने के कारण संसाधित उत्पाद का दाम प्रति कि ग्राम पर 300 से 450 रुपये तक बढ गये।

संसाधन की रीति

इस ककडी का संसाधन एच *स्काब्रा* के संसाधन से अलग है। इस जाति के संसाधन में उबालने के बाद गाड़ने की ज़रूरत नहीं है। संग्रहण के बाद ककडियों के रिक्तीकरण केलिए ढेर लगाके समेटते हैं। बाद में उबलती समुद्री पानी में डालकर आधे घण्टे तक उबालता है। उबालने के बाद ढेर लगाके समुद्र तट में डाला जाता है। अगले दिन साफ करके चार पाँच दिन सूर्य ताप में सुखाता है। सुखाई गई एक कि ग्राम बेश-द-मेर में 25-40 ककडी होंगी। समुद्री ककडी की लंबाई व्यतियान 110 से 260 मि मी और भार व्यतियान 140 से 340 ग्राम है।

पकड सांख्यिकी

1990 से 1993 की अवधि में 35.2 टन *अक्टिनोपाइगा इकिनिटिस* का मत्स्यन किया था। मत्स्यन केन्द्र किलकरै, पेरियपट्टनम, वेदालै और पाम्बन थे। इन में तीव्र मत्स्यन किलकरै में किया था।

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* डी बी. जेम्स और एस. बदरूदीन, केन्द्रीय समुद्री मात्स्यिकी अनुसंधान संस्थान कोचीन।

झींगा संवर्धन में समूह कार्रवाई

पी. राजीव और श्रीमती कृष्णा श्रीनाथ, केन्द्रीय समुद्री मात्स्यिकी अनुसंधान संस्थान, कोचीन

ग्रामीण जनता के समाज-आर्थिक विकास केलिए वैज्ञानिक झींगा संवर्धन का उल्लेखनीय स्थान है। इसके ज़रिए परंपरागत झींगा खेती में सुधार और अनुपयोगी जलश्रोतों का उपयोग हो सकता है। सी एम एफ आर आइ द्वारा चलाया उध्ययन ने झींगा खेती में लगे हुये कृषकों की कई समस्याओं पर प्रकाश डाले थे। झींगा कृषकों की ऐसी समस्याओं को सुलझाने केलिए संस्थान ने समूह कार्रवाई से वैज्ञानिक रूप से खेती करने का सुझाव चुने हुये कृषकों के बीच रखकर उनके विचारों के आधार पर कार्रवाई योजना तैयार की।

खेती का समूह कार्यक्रम ऐशिया के कई देशों में प्रचलित है। इसका पहला प्रबंधन कार्षिक मेखला में किया गया था। ई एस सी ए पी और एफ ए ओ क्षेत्रीय आयोजन आयोग की रिपोर्टों के अनुसार विकासोन्मुख देश इसका प्रचार करने में उत्सुकता

दिखाते हैं। केरल में एफ ए सी टी द्वारा त्रिवाड्रम में चलाये परीक्षण और राज्य के कृषि विभाग द्वारा खेती संवर्धन पर चलाया समूह कार्यक्रम सफल देखे गए है।

झींगा संवर्धन में समूह कार्रवाई के ज़रिए उत्पादन बढाने की प्रबंधन रीतियाँ यहाँ सुझायी गयी है। इसकेलिए कोचीन के चेल्लानम नामक स्थान के झींगा कृषकों को चुना गया। इस विषय पर उनके बीच चलाये गये कार्यार्थ अध्ययन ने व्यक्त किया कि करीब 87% किसान इसके अनुकूल और 13% इसके प्रतिकूल थे। उनसे की गयी चर्चा के अनुसार नीचे की योजनायें कार्रवाई केलिए प्रस्तुत है।

1. झींगा खेत का चयन और इसकी नक्शा की तैयारी
2. चुने गए क्षेत्र के कृषकों को मिलाकर एक कार्यकारी समिति की स्थापना करके उनकेलिए इसका उद्देश्य पर बैठक आयोजित करना।
3. कृषि रीतियों पर निर्णय लेने केलिए एक कार्यकारी समिति की स्थापना
4. कार्यान्वयन समिति की बैठक आयोजित करके खाद्य, बीज, निराकरण वस्तुएं आदि की खरीद पर निर्णय लेना और इस पर तकनीकी सलाह प्राप्त करना। इसके सामाजिक प्रयोग पर कलैंडर तैयार करना।
5. कार्यान्वयन समिति की दूसरी बैठक में वित्तीय विषयों पर निर्णय लेना।
6. कृषकों को सरकारी विशेषज्ञों से प्रशिक्षण देना।
7. खेती सुधार केलिए आवश्यक कदम उठाके खेती शुरू करना।
8. कार्यक्रम समिति की सप्ताहिक बैठक आयोजित करके प्रगति का पुनरीक्षण करना
9. कृषकों और तकनीकी विशेषज्ञों की बैठक आयोजित करके समस्याओं पर चर्चा करना।
10. खर्च पर लेखा-जोखा तैयार करना।
11. कृषकों व तकनीकी विशेषज्ञों की बैठक आयोजित करके हानि-लाभ पर परिचर्चा करना।

समुद्री शैवाल से नुस्खा तैयार करने की रीति पर मछुआ स्त्रियों केलिए आयोजित प्रशिक्षण कार्यक्रम का मूल्यांकन*

समुद्री शैवाल ऐसी एक प्रमुख समुद्री जीव संपदा है जिस से नयी चीज़ों का निर्माण किया जा सकता है। इस संपदाओं में समुद्र और नुनखरा जल क्षेत्र के सभी आल्गे शामिल हैं। तमिलनाडु के पाम्पान, मण्डपम और रामेश्वरम तट में प्रचुरमात्रा में यह उपलब्ध है। खाद्य वस्तुएं और औषधि के निर्माण में इसका उपोयग होता है। ऐगर ऐगर और सोडियम आलगिनेट निकालने के उद्योग में इसका इस्तेमाल करता है। जाम, जेल्लियाँ, वेफ़र और अचार तैयार करने केलिए भी यह उपयोगी है। समुद्री शैवाल से खाद्य पदार्थों के निर्माण के प्रचार करने और तदनुसार मछुआरों का आय बढाने के उद्देश्य से रामेश्वरम में कार्यरत ट्रेनिंग रूरल यूथ फोर सेल्फ एम्पलोयमेन्ट स्कीम के अधीन (ट्रैसेम) 30 मछुआ स्त्रियों केलिए तीन महीने का एक प्रशिक्षण कार्यक्रम चलाया। इसका आयोजन रामेश्वरम के एक स्वायत्त अभिकरण, सेन्टर फोर विमेन अग्रिकल्चर एन्ड रूरल डेवलपमेन्ट ने सी एम एफ आर आइ के सहयोग से किया था।

कार्यप्रणाली

भागीदारों की जानकारी का मूल्यांकन करने केलिए प्रशिक्षण के पहले और बाद में एक परीक्षा चलायी थी और समुद्री शैवाल के संवर्धन और उपयोग आदि विविध पहलुओं पर उनकी जानकारी की डाटा का संग्रहण किया था। प्रशिक्षकों के समाज-आर्थिक संबन्धी सूचना और कार्यक्रम पर उनकी राय की भी जानकारी संग्रहीत की।

प्रशिक्षकों की समाज-आर्थिक स्थिति

''ट्रैसम'' कार्यक्रम के प्रतिमान के अनुसार सभी प्रशिक्षक 18 से 35 साल की आयु श्रेणी के थे। इनमें 33% प्राथमिक

शिक्षा प्राप्त, 27% हाइस्कूल शिक्षा प्राप्त और 20% सेकन्डरी शिक्षा प्राप्त थे। कुल मिलाकर उनकी समाज-आर्थिक स्थिति निम्न स्तर की थी। केवल 7% पक्का घर में रहते थे। इन प्रशिक्षकों में 33% मत्स्यन करके जीवनी चलाते थे। 7% चाय की दूकान चलाते थे और बाकी अन्य कामों में लगे हुए थे।

संपर्क

प्रचार-माध्यमों का उपयोग बहुत सीमित था। केवल 13% लोग सूचना केलिए रेडियो का आश्रय करते थे। दूरदर्शन केवल 3% लोगों के पास थे और 30% अखबार के ज़रिए सूचना प्राप्त करते थे।

जानकारी का मूल्यांकन

प्रशिक्षण के पहले की जानकारी का निर्धारण कार्य अध्ययन द्वारा चालायी। इसके अनुसार केवल 3% की जानकारी मध्य स्तर की और बाकी 97% निम्न स्तर की थी।

प्रशिक्षण के बाद जानकारी में वृद्धि

प्रशिक्षण के बाद प्रशिक्षकों को, सवाल देकर, जो प्रशिक्षण के पहले दिया था, अध्ययन चलाया और इसमें 57% मध्य स्तर की जानकारी प्राप्त करते हुए और 37% उच्च स्तर की जानकारी प्राप्त करते हुए देखा। भाषण और निदर्शन के ज़रिए प्रशिक्षकों को समुद्री शैवाल के उपभोग के विविध पहलुओं पर विस्तृत जानकारी प्रदान की।

प्रशिक्षण डिज़ाइन का मूल्यांकन

प्रशिक्षण की रीति और डिज़ाइन का मूल्यांकन स्थान, अवधि, रीतियाँ और प्रशिक्षकों की संख्या के आधार पर किया गया। प्रशिक्षकों में 50% ने प्रशिक्षण स्थान के रूप में अनुसंधान केन्द्र पसन्द किये तो 37% अपने गाँव और 13% निकटस्थ गाँव।

प्रशिक्षण की अवधि मुख्य घटक होने के कारण प्रशिक्षकों से अपनी राय प्रकट करने केलिए कहा। 54% प्रशिक्षकों ने एक महीने का प्रशिक्षण आवश्यक माना तो 46% प्रशिक्षकों ने एक महीने से कम अवधि का प्रशिक्षण पसन्द किया।

प्रशिक्षण कार्यक्रम के मूल्यांकन करने पर समुद्री शैवाल के उपभोग के विविध पहलुओं पर यह बहुत ही उपयोगी सिद्ध हुआ।

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* शीला इम्मानुवल, सी एम एफ आर आइ का मण्डपम क्षेत्रीय केन्द्र, मण्डपम कैम्प, रामनाथपुरम-623 520

टूटिकोरिन तट में हस्त जिगन*

स्थानीय रूप से "कनवा" नाम से अभिहित शीर्षपादों से भारत आजकल विदेशी मुद्रा कमा रहा है। सातवीं दशक में शीर्षपादों को पकडने केलिए मूलत: ट्रालरों और शोर संपाशों का उपोयग होता था। आठवीं दशक के आरंभ में हस्त जिगन शीर्षपादों के मत्स्यन केलिए कार्यकारी देखा गया। विषिजम, कन्याकुमारी, टूटिकोरिन, मान्नार की खाडी में इसका प्रयोग करने लगा।

साधारणत: दो जिगों का परिचालन होता है। वे हैं नंगूरा तून्डिल और डिस्को तून्डिल। नंगूरा तूडिंल की परिचालन रीति पर प्रभाकरन नायर ने सी एम एफ आर आइ बुलेटिन 37 : 152-156 1986 में पहले विवरण दिये है। डिस्को तुन्डिल जापानी है। बेकलैट से जीवंत चिंगट के रूप में लुर माने फँसानेवाले जानवर का निर्माण किया गया है। लुर में लोड से निर्मित भार रखकर ठीक तरह चिंगट जैसे लगने की तरह लगाया जाता है। 16 से 18 नुकीले काँटे दो क्यारियों में पुच्छ भाग में लगाये जाते हैं। जिगों का परिचालन तट से 12 कि मी दूरी पर 30-50 मी गहराई में किया जाता है। रेतीले तटों और समुद्री घास बढनेवाले क्षेत्र में स्क्विड और कटलीफश या सुफेनक बसते हैं एसे क्षेत्र जिगन केलिए उचित है।

जिगों का परिचालन "वल्लम" या कट्टामरैन से होता है। शीर्षपाद मछलियों को देखने पर जिग धीरे धीरे उनके पास डालता है। रंगीन चिंगट रूपी लुर की ओर आकृष्ट होकर

आनेवाली मछली उसे खाने के श्रम में फँस जाती है। फंसी गई मछलियों को काँटा से बचाकर स्कूप नेट के इस्तेमाल करके उठायी जाती है। नंगूरा तूडिंल और डिस्को तुडिल में अंतर यह है कि पहले में चारे का इस्तेमाल होता है जबकि दूसरे में नहीं।

शीर्षपाद मात्स्यिकी के मत्स्यन मौसम में कन्याकुमारी के मछुए टूटिकोरिन जाते हैं। मत्स्यन मौसम दिसंबर से मई और जुलाई से सितंबर है। इस प्रकार का मत्स्यन लाभदायक होने के कारण तरूवायकुलम और कायलपट्टणम में भी इस तरीके से मत्स्यन शुरू किया गया है।

वर्ष 1990, 91, 92, 93 की अवधि में यथाक्रम 48.5, 22.3, 45.2 और 40.1 टन शीर्षपादों का अवतरण हुआ हैं। पकड का अधिकांश भाग *सेपिया फारोनिस* जाति का शीर्षपाद था। इसका आकार व्यतियान 160 से 410 मि मी के बीच में था। भार 520 ग्रा से 4.5 कि ग्रा के बीच में था।

संसाधन कंपनियों ने *सेपिया फोरोनिस* को उचित दाम दिया था। वर्ष 1990 में प्र.कि.ग्राम 28 रुपये पर लिये गये माल को वर्ष 1993 में 72 रु. दिया। लेकिन लोलिगो जाति को मिला उच्चतम दाम प्रति कि.ग्रा. 20 रु. था।

वर्तमान निरीक्षण में शीर्षपादों के मत्स्यन की एक नई रीति समझ में आई है। इस रीति में चुनी गई बडी जाति की पकड होती है अब तो मत्स्यन सिर्फ दिन में होता है रात में भी मत्स्यन शूरु करने के बारे में सोचना उचित होगा।

* सी एम एफ आर आइ के टूटिकोरिन अनुसंधान केन्द्र के टी.एस. बालसुब्रमण्यन, एस. राजपाकियम, एच. मोहम्मद कासिम और के.एम.एस. अमीर हंसा द्वारा प्रस्तुत की गई रिपोर्ट।

मानसून के दौरान बुकानीर ऐंचोवी का उपतट प्रवास*

श्वेत बेट्स भारत के दक्षिण पश्चिम तट के मुख्य वाणिज्यिक वेलापवर्ती मात्स्यिकी संपदाओं में एक है और सामान्यतया ये उपतट वेलापवर्ती जाति है। लेकिन बुकानीर ऐंचोवी *एंक्रासिकोलिना प्यूंक्टिफेर (स्टोलेफोरेस बुकानीरी)* समुद्री जाति है और ये दक्षिणपश्चिम मानसून (जून-सितंबर) की अवधि में उपतट जल में प्रवास करती हैं। ये ट्यूना केलिए उचित चारा है।

विषिंजम में 94 जूलाई 19 से 22 तक उपतट में इनका प्रवास भारी मात्रा में देखा गया और पोत संपाश में इसका भारी अवतरण भी हुआ। उपर्युक्त चार दिनों में कुल श्वेत बेट पकड 222.7 टन थी जो पोत संपाश के ज़रिए पकडी गयी कुल मछली के 94.8% जिसमें *ई. प्यूंक्टिफेर और ई. डेविसी* क्रमशः 83.6% और 11.2% थे।

इन दिनों मानसून बहुत ज़ोर दार था और जल का तापमान 24.5°C से 22.5°C हो गया।

ई.प्यूंक्टिफेर की कुल लंबाई 55-119 मि मी के बीच में थी। पकड में अधिकांश 100-109 मि मी लंबाई की मछली थी। मादा जाति के 71% और नर जाति के 95% अंडरिक्त जननग्रंथीवाले थें। इस जाति का अंडजनन काल दीर्घकालिक है और मानसून काल भी इस में शामिल हैं। संग्रहीत नमूने में 95.6% मछली का पेट खाली और बाकी आधा भरी हुई अवस्था में थे।

यद्यपि *ई.प्यूंक्टिफेर* के उपतट में प्रवास करनेवाले समूह को अंडजनन स्टॉक कहा जा सकता है तथापि यह देखा गया है कि अधिकांश मछली अधिकतम आकार की थीं। अंडजननकाल दीर्घ होने के कारण मानसून के दौरान रिक्रूटमेन्ट रीति पर उपतट स्टॉक के शोषण से कोई बुरा प्रभाव नहीं होगा। विषिंजम में चलाये गये परीक्षण व्यक्त करता है कि इस जाति को पेन में तीन महीने तक रखी जा सकती है। मानसून के दौरान इन्हें दो-तीन महीने तक पेन में रखकर, फिर लक्षाद्वीप में ट्यूना केलिए जीवित चारा के रूप में उपयोग करने केलिए ले जा सकता है। इस पर परीक्षण करना अच्छा होगा।

*जी. गोपकुमार, आर. भास्करन आचारि और ए.के. वेलायुधन सी एम एफ आर आइ का विषिंजम अनुसंधान केन्द्र

नील तिमि *बालिनोप्टीरा मसकुलस* लिनेयस का अवतरण*

उत्तर विशाखपट्टनम के मंगमारिपेटा अपतट में 1994 मई 4 को एक जीवंत नील तिमि का अवतरण हुआ। यह *बालिनोप्टीरा मसकुलस* लिनेयस था। इसका स्थानीय नाम है ''पप्पर मीनु''। मशीनीकृत सेल क्राफट से परिचालित सिन्थेटिक ड्रिफ्ट गिलनेट से इसे पकडा था। परिचालन मंगमारिपेटा के अपतट समुद्र में 50 मी गहराई में किया था। कोई दुर्घटना से जाल में फंस गया तिमि की लंबाई 12.7 मी थी। इस जाति के तिमि का धंसन पहले पाँच बार हुये है। ये कलीकट में 25-5-1966, मान्नार खाडी में 20-12-76, नारक्कल, कोचीन में 31-9-85, मोट्टुप्पल्ली, आन्ध्रप्रदेश में 12-12-88 और चेल्लानम, कोचीन में 1993 को हैं।

* रिपोर्ट: श्री मोहनराज, श्री एम. वी. सोमराजु और सी.वी. शेषगिरि राव, सी एम एफ आर आइ का विशाखपट्टणम अनुसंधान केन्द्र

टूटिकोरिन से बालिस्टिड्स की भारी पकड*

तमिलनाडु में ''क्लात्ती'' नाम से जाननेवाली लैदर जाकट्स बलिस्टिड्स टूटिकोरिन तट की मात्स्यिकी नहीं होती हुई भी वहाँ प्रचालित ट्राल जाल में एक उप-पकड के रूप में प्रचुर मात्रा में प्राप्त होती है। लेकिन कोई मांग नहीं होने के कारण इन्हें समुद्र में ही वापस फेंक देते है। पर आज के दिन सूखी मछली के व्यापार में लगे हुए कुछ लोगों ने इनकेलिए भी मांग देखी और इन्हें खरीदने लगा। ट्राल प्रचालकों ने भी इसका फायदा उठाने लगे।

जुलाई 1993 के दूसरे हफ्ते में कुछ ट्रालरों ने बालिस्टिडों की भारी मात्रा में अवतरण किया। उस समय वाणिज्यिक दृष्टि से प्रमुख मछलियों और ''कलासल'' नाम से जाननेवाली ट्राश मछलियों की कमी के कारण कुछ मछली व्यापारियों ने बालिस्टिडों के नीलाम में रुचि प्रकट की जिससे मछली चूर्ण की तैयारी केलिए कच्चा माल बनाने में वे सफल भी हुए।

जुलाई 93 के दौरान 130 से 160 ट्राल जाल एककों का प्रचालन हुआ। आकलन के अनुसार प्रचालित 3969 ट्रालर एककों में केवल 680 एककों से बालिस्टिडों का अवतरण हुआ और अवतरण प्रति एकक 446.4 कि.ग्रा की पकड दर के अनुसार 303.5 टन आकलित किया गया । पकडे गम बालिस्टिडों का नीलाम किया गया 20 कि.ग्रा के प्रति बाल्टी को 16 रु से 20 रु मिला।

बालिस्टिड मात्स्यिकी की मुख्य जातियाँ *बालिस्टेस नैगर* (89.5%), *अडोनस नैगर* (8.6%) और *बालिस्टेस कापिस्ट्राटस* (1.9%) थी। बालिस्टिडों के नमूनों को संग्रहित करके आयाम रेंच, लंबाई-भार संबन्ध, आहार नली में पाये हुए वस्तुएं, जनन ग्रंथियों की प्रौढता की स्थितियाँ आदि पर विश्लेषण किया। *बी. नैगर* का आयाम रेंच 125-129 मि मी से 160 से 164 मि मी में विविध था। दूसरी मुख्य जाति *ओ. नैगर* का आयाम 120-124 मि मी से 180-184 मि मी में विविधता दिखायी और *बी. कापीस्ट्राटस* 140-144 मि मी से 210-214 मि मी के बीच।

बी. नैगर, ओ. नैगर और *बी. कापीस्ट्राटस* के. क्रमश: 100, 80 और 40 नमूनों को काटकर जननग्रंथियों की प्रौढता पर अध्ययन किया। इन तीन जातियों के सारे के सारे नमूने अनिश्चित अवस्था में थी।

उपर्युक्त तीनों जातियों के लंबाई-भार संबन्ध का भी अध्ययन किया। इसकेलिए 125-129 मि मी से 160-164 मि मी आयाम के *बी. नैगर* के 100 नमूने, 120-124 मि मी से 180-184 मि मी आयाम रेंच के *ओ. नैगर* के 80 नमूने और 140-144

मि मी से 210-214 मि मी आयाम रेंच के *बी. कापिस्ट्राटस* के 40 नमूनों का विश्लेषण किया था और इन नमूनों के लंबाई - भार संबन्ध का विवरण देने वाले समाश्रयण समीकरण नीचे के प्रकार है।

बी. नैगर : Log W = -4.0783 + 2.7525 Log L (r= 0.9271)

ओ. नैगर: Log W= -4.0474 + 2.7376 Log L(r=0.9725) *बी. कापिस्ट्राटस:* Log W= +3.3741 + 2.4357 Log L (r=0.9729)

आहार नली में पाये हुए वस्तुओं का अध्ययन यह व्यक्त करता है कि इन मछलियों में आहार नाल ग्रासनली (इसोफागस) से गुदा तक गहरे रूप में संवलित (convoluted) है, जठर और जठरनिर्गमी अंधनाल (pyloric caeca) इन में नहीं है।

बी. नैगर: 125-160 मि मी आयाम और 55 ग्रा से 105 ग्रा भार के 40 नमूनों के आहार नलियों में पाये हुए वस्तुओं पर परीक्षण करने पर व्यक्त हुआ कि इनका मुख्य भोज्य छोटी मछली है। इसके अलावा मलस्क (द्विकपाटियाँ और गस्ट्रोपोड्स) कर्कट के कुछ भाग भी जठर में देखे गये।

ओ.नैगर: इस जाति के 120 मि मी से 180 मि मी तक आयाम और 45 ग्रा से 145 ग्रा. भार के 25 मछलियों पर परीक्षण चलाया और सभी में एम्फिपोड्स अर्ध पाचित अवस्था में देखा गया।

बी. कापिस्ट्राटस: इस जाति के 140 और 210 मि मी के बीच आयाम वाले 10 नमूनों पर परीक्षण चलाया और जठर में *सीपिया* जाति के टेन्टेकल्स और काला पंक के अंश देखा गया।

इन तीन जातियों में आहार की मात्रा 0.40 मि लि से 1.00 मि लि में विविधता दिखायी पडी।

ट्राल जालों के ज़रिए प्राप्त बालिस्टिडों को मुख्यत: मत्स्य चूर्ण बनाने केलिए उपयोग करते है। काँटा डोर और ड्रिफ्ट जाल से प्राप्त बडे बालिस्टिडों का स्थानीय बाज़ारों में मानव उपभोग केलिए बेच दिया। छोटे बालिस्टिडों के चमडा निकालकर इसका मांस उपलब्ध कराने की उचित संसाधन रीति उभर आने पर आय में की वृद्धि साध्यता है।

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* टी. एस. बालसुब्रमणियन, एस. राजपाकियम, के.एम.एस. अमीर हंसा और एच मोहम्मद कासिम, सी एम एफ आर आइ का टूटिकोरिन अनुसंधान केन्द्र, टूटिकोरिन - 628001 द्वारा तैयार की गयी रिपोर्ट।

मान्नार खाडी के पेरियपट्टिनम में प्राप्त सबसे बडा सूर्यमीन (मोला) *मास्ट्यूरस लान्सियोलाटस* *

मोलिडे कुटुम्ब के सूर्यमीन महासागरीय जातियाँ होती है। भारत तट में इनकी उपस्थिति असाधारण होते हुये भी *रानजानिया ट्रंकाटा, आर. टाइपस, मोला मोला, मास्ट्यूरस आंक्सियूरोप्टीरस* और *एम. लान्सियोलाटस* की उपस्थिति पर रिपोर्ट की गयी है। हाल ही में टूटिकोरिन से 1535 मि मी कुल लंबाई का एक सूर्यमीन *मास्ट्यूरस लान्सियोलाटस* प्राप्त हुआ।

पेरियपट्टिनम मछली बाज़ार में 23.1.1994 को 1830 मि मी लंबाई के एक सूर्यमीन *मास्ट्यूरस लन्सियोलाटस को लाया गया था।* मछली कोई क्षति के बिना ताज़ा स्थिति में थी। अंडाकार का इसका शरीर गहरे धूसरे रंग का था और चमडा रूक्ष थी। प्रोथ वृत्ताकार, मुँह अंतस्थ था। इसका भार 75 कि.ग्रा था। भारतीय समुद्रों से अभी तक प्राप्त सूर्यमीनों में यह बडी है। इसका मांस अखाद्य होने के कारण इसे बाद में दफन किया गया।

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*सी एम एफ आर आइ के मंडपम क्षेत्रीय केन्द्र, मंडपम के एम. बदरुद्दीन द्वारा तैयार की गयी रिपोर्ट

माल्प से कोष संपाश के ज़रिए अन्य गुणतायुक्त मछलियों के साथ शिंगटियों का अवतरण

माल्प में 30-9-94 को प्रचालित 3 कोष संपाशों ने 2.2 टन सुरा, 1 टन राचीसेन्ट्रोन जातियाँ और 0.65 टन सुरमई (एस. कमेर्सन) के साथ 3 टन शिंगटियों का अवतरण किया। उपर्युक्त तीन एकक 36 मी गहराई में प्रचालित किया था। शिंगटियों की पकड में *टाचिसुरस सेराटस* (90%) और *टी. डसुमेरी* (10%) उपस्थित थी।

शिंगटियाँ आकार में बडी होने के कारण प्रत्येक मछली औसत 105/- रु. पर बिक गयी। ये तीन कोष संपाशों के ज़रिए अर्जित कुल आय 1,31,050 रु. था।

माल्प में पिछले हफ्ते भी 24.5 टन शिंगटियों का अवतरण हुआ। दक्षिण कन्नड तट पर शिंगटियों का यह अवतरण अनेक सालों के बाद हुआ।

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* सी एम एफ आर आइ के मँगलूर अनुसंधान केन्द्र, मँगलूर के एस. केम्पराजु, बी. श्रीधरा, एच.एस. महादेवस्वामी और पी. यू. सक्करिया द्वारा तैयार की गयी रिपोर्ट

GUIDE TO CONTRIBUTORS

The articles intended for publication in the MFIS should be based on actual research findings on long-term or short-term projects of the CMFRI and should be in a language comprehensible to the layman. Elaborate perspectives, material and methods, taxonomy, keys to species and genera, statistical methods and models, elaborate tables, references and such, being only useful to specialists, are to be avoided. Field keys that may be of help to fishermen or industry are acceptable. Self-speaking photographs may be profusely included, but histograms should be carefully selected for easy understanding to the non-technical eye. The write-up should not be in the format of a scientific paper. Unlike in journals, suggestions and advices based on tested research results intended for fishing industry, fishery managers and planners can be given in definitive terms. Whereas only cost benefit ratios and indices worked out based on observed costs and values are acceptable in a journal, the observed costs and values, inspite of their transitionality, are more appropriate for MFIS. Any article intended for MFIS should not exceed 15 pages typed in double space on foolscap paper.

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