CMFRI newsletter

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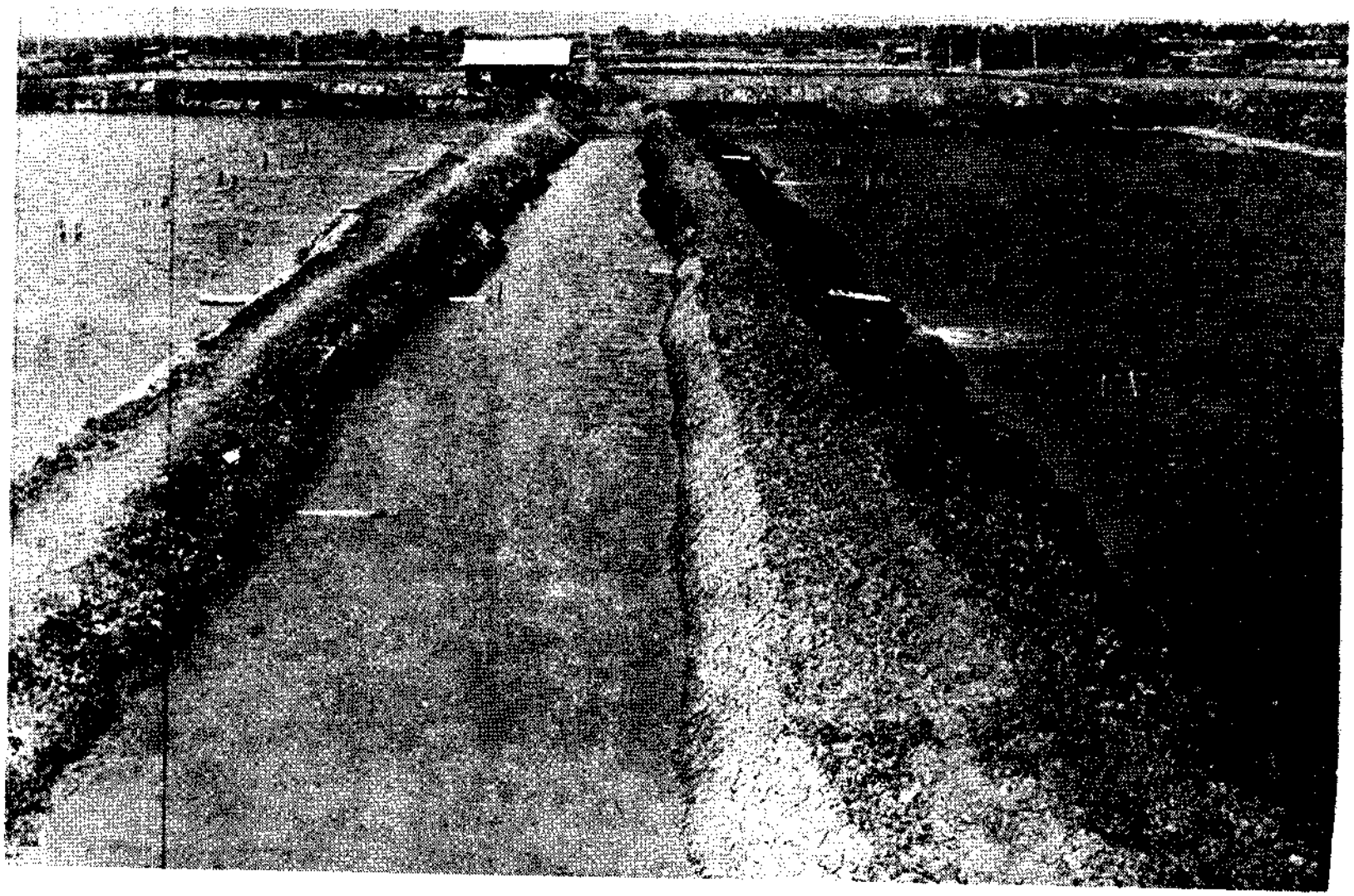
Prawn Culture in Salt Pans



Prawn Culture in Salt Pan Areas - A Profitable Venture

The high production rates of 1200-1600 kg/ha/crop are a record for salt pan areas in India. Even in brackishwater tidal ponds the productio rates achieved in monoculture of prawns fluctuate between 300-600 kg/ha/crop. The very encouraging results obtained at Veppalodai, indicate that the white prawn P. indicus is a prime species for culture in salt pan areas where the salinity ranges from 38-48 ppt.

Penaeid prawns and marine fishes which can tolerate wide fluctuations in salinity are cultured in salt pan areas in many parts of the world without any hindrance to the normal production of common salt. The water let out from the culture ponds is discharged into adjacent ponds from where it is drained into different shallow ponds, for evaporation and finally led into the crystallisation ponds. Semi-intensive prawn culture practices in salt pan sites have been tried in India in a few areas around Kakinada in Andhra Pradesh and Tuticorin and Manakkudy near Cape Comorin in Tamil Nadu. Similar developments have also been made in the Philippines. In Japan, about 70% of the prawn farms are constructed in salt pan areas where prawns attain the harvestable weight of 20 g in 6 months and yields up to 2500 kg/ha have been achieved with *Penaeus japonicus*.

Construction of pond in salt pan area

The areas in and around the salt pans at Veppalodai, north of Tuticorin in Tirunelveli District of Tamil Nadu, provide suitable environment for the occurrence, survival and growth of some of the commercially important marine fishes and prawns. Possibilities of developing mariculture practices in the salt pan reservoirs have been explored earlier by the scientists of the Central Marine Fisheries Research Institute but these experiments were badly affected by the presence of predators. Hence, a new site adjacent to the existing salt pans was developed exclusively for prawn farming. On the southern side of the Kallar estuary, at Veppalodai a salt pan owner has converted 3.5 ha of marshy tidal flats into five productive prawn culture ponds with the technical help of the scientists of the Tuticorin Research Centre. Two of them are 1.0 ha and three are 0.5 ha in area. Soil is clayey mixed with sand and rich in organic matter. The estuarine area has a moderate tidal range of about 0.75 m and is rich in prawn seed resources. Prawn culture ponds are constructed in an elevated place of the flat. The ponds are rectangular in shape with inlets and outlets for water on opposite bunds. The bottom slopes gently towadrs the bund with the outlets. Water is pumped with a 5 H.P. diesel pump from the tidal creek to maintain a depth of 0.7 m in the ponds. One fifth of the volume of water in the ponds is drained through the outlet daily and replaced by pumping seawater from the creek. The pumped water passes through a velon screen before entering the pond to prevent the

Sea water being pumped into the culture pond

Harvesting by dipnet in catching pit

entry of unwanted organisms. Salinity ranges from 38-48 ppt, dissolved oxygen 3.80-4.42 ml/l and pH 7.90-8.25. The site is free from predators.

Before stocking, the ponds are treated with 500 kg/ha of chicken dung to stimulate growth of benthic algal communities on which the prawns feed. Chicken dung at the rate of 100 kg/ha is also added periodically to maintain good primary productivity throughout the culture period. Supplementary feeding is not necessary during the first month since the benthic algal growth is good. Pelletized feed manufactured by Tatas and obtained from MPEDA at subsidised rates of Rs. 2.80/kg is given twice a day at the rate of 7 - 10% of body weight of the stock from the fortieth day onwards. In addition to this, a mixed feed of rice bran, groundnut oil cake and wheat flour is given at 5% of body weight after 3-4 months. Clam meat and trash fish are also given occasionally. The growth of the prawns in the ponds is monitored every fortnight by sampling with cast nets.

Two 0.5 ha ponds (Pond A and B) and a 1.0 ha pond (Pond C) were stocked with the seed of *P. indicus* of 15-22 mm in February-March 1986 at the rate of 78,000; 128,000 and 121,000 per ha respectively. Pond A was harvested after 6 months and Ponds B and C after 7½ months after complete draining of the ponds. The production rate from these ponds was 1200 kg/ha, 1604 kg/ha and 1234 kg/ha, the average size of harvested prawns being 16 g, 13 g and 11 g respectively. The survival rate of prawns in the 3 ponds was 96%, 95% and 92 per cent respectively. A total of 2604 kg of prawns was harvested from these 3 ponds and the gross income to the pond owner was Rs. 1,11,619/-. The total expenditure on the purchase of feed, cost of seawater pumping, collection of seed, watch and ward and harvesting was about Rs. 35,000/-.

The high production rate of 1200 - 1600 kg/ha/crop is a record for salt pan areas in India. Even in brackishwater tiday ponds the production rates

achieved in monoculture of prawns fluctuate between 300-600 kg/ha/crop. The very encouraging results obtained at Veppalodai, indicate that the white prawn *P. indicus* is a prime species for culture in salt pan areas where the salinity ranges from 38-48 ppt. The high survival rates obtained were mainly due to the absence of predators and the frequent exchange of water in the ponds. The smaller harvest size of prawns in ponds B and C compared to pond A is due to the higher stocking densities adopted in the former ponds. It is suggested that the stocking density may be restricted to about 30,000/ha. Higher stocking densities lead to retardation of growth, prolongation of culture period and production of smaller prawns which fetch a lower price; the higher yield is offset by the lower unit price. With the suggested stocking density two crops can be raised in a year. The experiments have shown that management practices like maintenance of water quality and elimination of predators can give higher yields.

There is great scope for culturing *P. indicus* in the salt pan areas in Gujarat, Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh. Pump-fed ponds with provision for daily exchange of water can easily be constructed in such areas with minimum cost. The same pumps used for the salt works can be used for pumping seawater into the culture ponds.

The present experiments at Veppalodai were monitored by Shri R. Marichamy, Scientist S-2 and S. Rajapackiam, Technical Assistant of Tuticorin Research Centre.

Pond culture of *P. indicus* in the salt pan area at Veppalodai

Ponds	A	B	C
Area of pond	0.50 ha	0.52 ha	0.95 ha.
Date of stocking	8-2-86	1-3-86	20-2-86
Size at stocking	20 mm	22 mm	15 mm
Actual no. stocked	39,000	66,500	1,15,000
Stocking density (Nos./ha)	78,000	1,28,000	1,21,000
Date of Harvest	2-8-86	10-10-86	10-10-86
Survival rate	96 percent	95 percent	92 percent
Prawns harvested	600 kg	835 kg	1169 kg
Production rate (kg/ha)	1200	1604	1234
Av. size at harvest	125 mm	123.4 mm	116 mm
	16 g	13 g	11 g
Gross income	Rs 33,000	Rs 36,846	Rs 41,773
Price per kg.	Rs 55	Rs 46	Rs 37

PRAWN CULTURE IN SALT AREAS — FLOW CHART

PREPARATION OF POND

a. Manure with chicken dung @ 500 kg/ha
b. Let in 10 cm depth of water to develop lab-lab (7-10 days)

STOCKING

a. Stock *P. indicus* seed 15-25 cm total length @ 80,000 nos/ha.; Seed can be collected from the surrounding creeks.

MANAGEMENT

a. Monitor growth of prawns by sampling at fortnightly intervals.
b. Drain 1/5 of water daily and replenish with seawater pumped from creek.
c. Manure with chicken dung @ 100 kg/ha whenever the water tends to become clear
d. 40 days after stocking, daily feeding with pelletised feed @ 7-10% of weight of stocked prawns.
e. After 3-4 months a mixture of equal proportions of rice bran, groundnut oil cake, wheat flour and trash fish given @ 5% of weight of stocked prawns.

HARVESTING

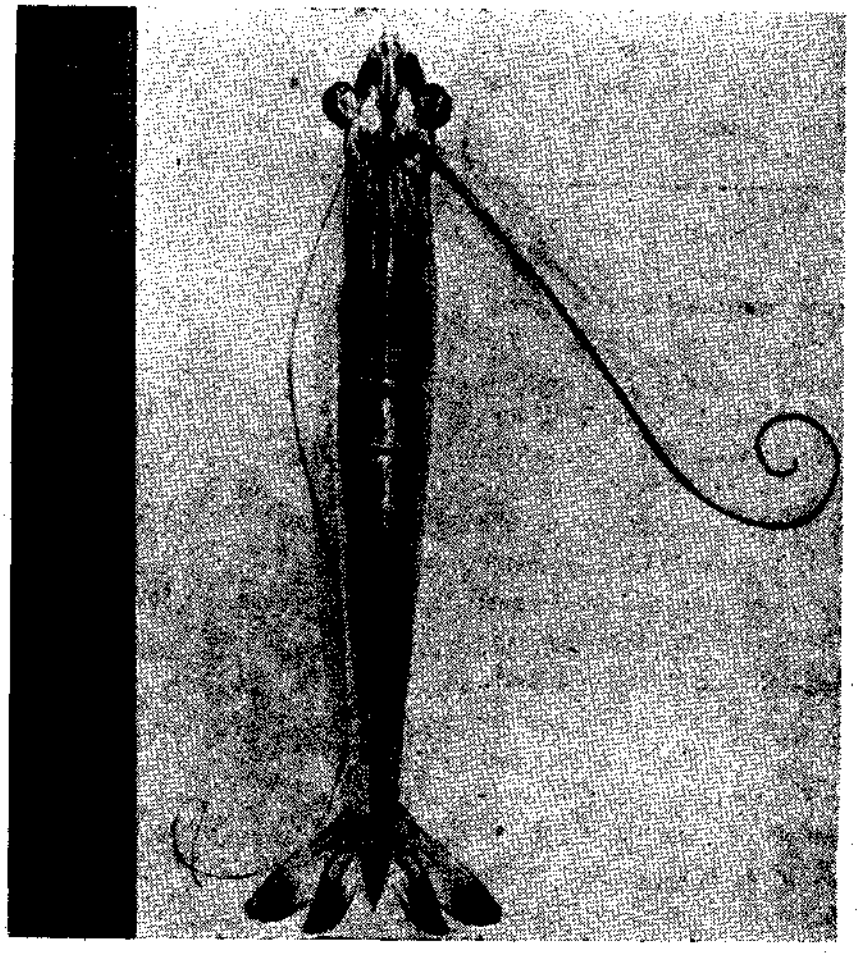
a. Can be harvested after 6 months or earlier when the average weight of prawns is 15-16 g (about 125 mm).
b. Drain the pond by letting out water through outlet.
c. Collect prawns from the harvesting pit near outlet.
d. Two crops, each of 6 months duration can be grown in a year.

Further Success in Controlled Breeding of Penaeid Prawn

The king prawn *Penaeus latisulcatus* which forms a fishery of considerable magnitude in Thailand, Australian and Japanese waters has been recorded in stray numbers from the estuaries and inshore seas of the Indian mainland and also from the bays of oceanic areas, namely, Lakshadweep and Andaman and Nicobar islands. Recently, juveniles of king prawns were collected from the sandy bar mouth area of Kovalam backwater (near Madras) during May-July and stocked in grow-out pond system at Muttukadu Mariculture farm of the Institute. The prawns were fed with the flesh of backwater clam, *Meretrix casta* at a rate of 5% of their body weight. During a period of 73 days of rearing, an average growth of 29.0 mm in total length/month (4.2 g total weight/month) was observed.

Interestingly, on the 73rd of culture, female prawns were found with impregnation and developing ovary which indicated that this species could attain maturity within 2-3 months in confined water rearing. Three impregnated females of 108-114 mm total length and five mature males of 99-118 mm total length were selected and stocked in 1-tonne-fibre glass broodstock tank at Kovalam Field Laboratory. After acclimatizing the prawns for two days, the females were subjected to unilateral eye ablation using electrocauterisation apparatus in order to induce maturation. Backwater clam *M. casta* at the rate of 20% of their body weight was given as feed. The salinity of the sea water used in the broodstock tank varied from 33.00-34.12‰. The pH of the water was maintained at 8.0-8.2 All the three females spawned at varying intervals after ablation within a period of 25 to 46 days and released a total number of 37,210 viable eggs, from which 29,385 nauplii emerged. The reared larvae were fed with a diet of unicellular diatom culture consisting of *Chaetoceros spp* and attained post larval stage in 9-11 days with a survival rate of 30.9%.

This is the first time in India that a pilot experiment conducted on the induced maturation



Two-months pond-reared king prawn

Pilot Whales Caught at Pudukuppam

Two female pilot whales of the species *Globicephala macrorhynca* Gray) measuring 302 cm and 140 cm respectively were caught in gill nets during fishing operation at Pudukuppam fish landing centre near Cuddalore on 29 July. The estimated weight of the two whales was about 500 kg and 40 kg respectively. The stomach of the whale was cut open and the analysis revealed a few beaks of cephalopods. After the postmartum operation, the whale was burried in the seashore to extract the skeleton. This was reported by Dr P. Nammalwar, Scientist S-2 at Madras Research Centre.

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and postlarval production of the king prawn, *P. latisulcatus* under controlled conditions has yielded fruitful results. The present observation as well as those made in Japan and Australia suggest that *P. latisul catus* stands first for its suitability for cultivation in the sandy lagoons and bays available along our mainland coast and also at Lakshadweep and Andaman and Nicobar islands. The present success in the research on the king prawn has been achieved by the team consisting of Shri M. Kathirvel, S-2, Dr V. Selvaraj, Shri S. Palanichamy and A. Ramakrishnan Technical Assistants at Madras Research Centre.

Bumper Landings of Cuttlefish at Colachel

An estimated total quantity of 27 tonnes of cuttlefish (*Sepia* spp.) was landed by trawl nets at Colachel in Kanyakumari District, Tamil Nadu on 8 September. Landing of cuttlefish of this magnitude is unusual to this area according to the reports of Shri I. P. Ebenezer, Technical Assistant from Kanyakumari.

The trawl nets, 52 in all, each operated from 9m-long mechanised vessels of 60-80 HP with a crew of 5, 25 km south-west off Colachel at 50-55 m depth landed an estimated total catch of 45.8 tonnes. Among them *Sepia* spp. (*S. Pharaonis* and *S. aculeata*) constituted 59.9%, *Nemipterus sp* 24.8%, prawns 3.6%, *Thenus sp.* 0.5%, rays 2.3% and fishes belonging to various other groups 9.9%.

The average catch per unit for all items combined was 881.5 kg and for Sepia alone it was 519 kg.

Apart from the above cuttlefish catch another estimated total catch of 2156 kg exclusively of *Sepia pharaonis* was also landed that day by fishermen operating anchor hooks (jigging) from catamaran 7 km off Colachel at 40-45 m depth Eighty five units were operated and the catch per unit worked out to 24.4 kg.

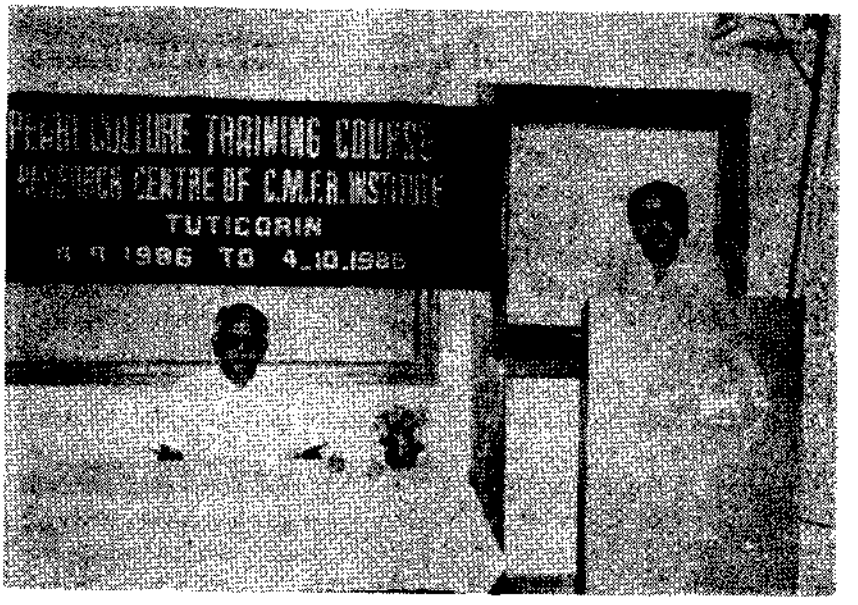
The Cuttlefish which has been selling in this region around Rs. 15/- per kg came down to Rs. 7/- that day. Since the export agents could not take the entire landings, about 25% of it were removed for sale in local markets and for sun drying.

Heavy landings of squids (*Loligo* spp.) by boat seine were also reported from neighbouring landing centres.

The cuttlefish being sorted into groups

Training in Pearl Culture

A short-term training in pearl culture has commenced at the Tuticorin Research Centre. Five trainees including two sponsored by the Department of Fisheries, Gujarat, one by Tamil Nadu Pearls Ltd., one by the Department of Fisheries, Lakshadweep and a private entrepreneur are being trained under the programme consisting of lectures and practicals relating to all aspects of pearl culture and pearl oyster resources. The training will conclude on 4 October.



Sri K.A. Pota, one of the trainees of the training programme in pearl culture speaking at the valedictory function

Scientists Trained in Shellfish Farming

The Tuticorin Research Centre conducted a training course on the various farming activities of shellfish for the newly appointed 27 ARS Scientists from 2-27 August. The course included lectures, field trips, practicals and demonstrations.

A I R Science Sammelan — Best Pavilion Award Again to CMFRI

This time the Tuticorin Research Centre of CMFRI bagged the best educational pavilion award by ONGC in the exhibition organised by All India Radio, Madras, in connection with the Fifth Science Sammelan at Tirunelveli. The Madras Research Centre won the same award in 1984. CMFRI wins the award consecutively for the third time. The pavilion with live marine anmals and flora of economic importance in aquarium tanks, models and photographs attracted large crowds. The scientists of the Research Centre also participated in the seminar 'Science in Twentifirst Century' and a paper on prospects of mariculture in 21 Century prepared by Shri R. Marichamy, Scientist, was presented.

The Tuticorin Research Centre participated and won award in flower show organised by Madurai Horticultural Society at Madurai in February and not the Mandapam Regional Centre as published earlier.

Dr K. Satyanarayana Rao, Scientist S-3 receiving the shield from the District Collector, Tirunelveli.

Measurement of Bacterial Growth Rates in Aquatic Systems

It is evident that all the four major nutrient cycles are controlled by bacteria and they have a very dominant and important role to play in the economy of aquaculture systems. Phytoplankton take up inorganic matter from the environment to build up organic matter by photosynthesis and bacteria restore them in the environment by the process of decay of organic matter. This bacterial industry is very essential for the sustenance of life in all aquatic systems. There are different kinds of bacteria and these can be grouped into two chief categories. The autotrophs and heterotrophs. Autotrophs or producers derive their energy from inorganic materials and they contribute 30% primary production in the total production by micro-organisms. Heterotrophs are consumers which live by the oxidation or fermentation of organic matter and they will function in decomposing the organic substances into inorganic substances that ceaselessly accumulate in the habitat. These are then released for re-synthesis. Secondly, inorganic substances released through bacterial enzymes may either be oxidised or transformed by the chemoautotrophs or may be directly used up by phytoplankton. Thirdly, the heterotrophic bacteria and autotrophic bacteria serve as food for small organisms such as protozoans and zooplankton. The most important factor that influence the culture of fishes in a pond is the nature and extent of its plankton production. The very survival of fish and fish larvae in a culture pond is dependent on the type and availability of food. Increasing bacterial productivity in aquaculture ponds will help in economising the culture system through reduction in costly inputs such as artificial feeds. Therefore it is essential to have an understanding of the broad principles governing bacterial productivity through a detailed study of the process so that it will be possible to accumulate valuable information on this vital process. The quantitative studies in carbon cycling in aquatic environments cannot be complete without information on the amounts of organic matter transferred between different trophic levels by heterotrophic bacteria.

Increasing bacterial productivity in aquaculture ponds will help in economising the culture system through reduction in costly inputs such as artificial feeds. Therefore it is essential to have an understanding of the broad principles governing bacterial productivity through a detailed study of the process so that it will be possible to accumulate valuable information on this vital process.

A number of methods have been proposed for measuring microbial growth rates, but many are not specific for bacteria or do not include the whole population. The use of radioactive nucleic acid precursors especially, thymidine to measure the rate of DNA systhesis has many pre requisites of the ideal method. Thymidine (Thymine - 2 desoxyribose - tdv) is unique among nucleosides because the only function of its nucleosides in cells is participation in the synthesis of DNA. Thymidine is incorporated into DNA via salvage pathway. The best radio-active label is methyl H3 because subsequent conversion to uracil removes the label. DNA is not labelled in microorganisms which lack thimidine kinase. The lack of thymidine kinase in blue-green algae and many enkaryotic microorganism is of considerable advantage for studying only the heterotrophic bacterial production in aquatic systems.

Bacteria can take organic molecules much more rapidly than do algae or protozoa, and can use nanomolar concentration of organic molecules than other micro-organisms. Tritiated Thyamidine will be taken up only by bacteria in a mixed community. Although bacteria are not the only organisms that utilise thymidine, they are the only ones that will utilise them in a short experimental period.

RNA content is variable from 10-30% and it is not dependent on growth rate. RNA Synthesis is complex. MRNA turns over rapidly 2.5% of the total RNA content but 50% is the rate of synthesis. RNA Synthesis rate is not directly proportional to growth rate in slowly growing cells.

DNA Synthesis rate is directly proportional to growth rate. Direct measurement of bacterial growth will work when grayers are removed from the system. In practice it is difficult to remove grayers, particularly microflagellates. So indirect methods are developed. The present method involves short incubations to determine the rate of incorporation labelled precursors into RNA & DNA. These approaches are in active state of development at present and seem to have great potential. Testing in a variety of environments and clarification on their bio-chemistry is still needed.

In this context, Dr D. J. W. Moriarty's visit to Centre of Advanced Studies in Mariculture in CMFRI is of great importance. Dr Moriarty had come as an expert consultant in bacterial growth rates and productivity under the FAO/UNDP programme. He is at present a Principal Research Scientist in Division of Fisheries Research, CSIRO Marine Laboratories, Cleveland, Australia. He is presently working in productivity and trophic role of microorganisms especially bacteria in marine environments, Food chains studies in sea-grass bed, mangrove swamps, coral reefs and aquaculture ponds.

Dr Moriarty is being presented with a memento by Dr PSBR James, Director, CMFRI

Dr Moriarty has also worked under Royal Society of London as a Biochemist in Lake George, Uganda on Feeding and digestion of cyanobacteria by Tilapia from 1969 - 1973. He was also a Queen's Fellow in Marine Sciences in the University of Maryland and worked on the role of bacteria in seagrass bed food chain. He is a member of Australian Society for Microbiology, American Society for Microbiology, Society for General Microbiology, U.K. and Australian Marine Science Association. He has 41 publications in reputed journals and books.

A fortnight's consultancy programme was planned to give enough opportunity to the scientists and research students to discuss the details of methodology isotope dilution, time courses for rates of labelling micro molecules, liquid scintillation counting technique analysis and interpretation of results. Techniques in fluorescent microscopy gave data on bacterial count which was used to calculate the bacterial productivity of aquaculture pond. Dr V. Chandrika, Scientist S-2, was his counterpart for co-ordinating the programme.

Dr Moriarty's programme included 2 group discussions on specific aspects of bacterial growth rates and productivity and 4 Seminars on bacterial ecology and ecophysiology and a six-day workshop on bacterial productivity in the aquaculture ponds.

The training and knowledge given by Dr Moriarty will stimulate research work in this field and will help in economising the culture system through reduction in costly inputs such as artificial feeds.

VISITORS

The activities of the CMFRI are being explained to Shri Yogendra Makwana, Union Minister of State for Agriculture when he visited Cochin on 3 July

Cochin :

Shri Nilamani Das, Minister for Agriculture, Govt. of Assam, accompanied by Shri Hrishbhaben Bharati, M.L.A. and Vice Chairman, Advisory Council for BC Welfare visited CMFRI on 21 September.

Dr N. A. Jan, Director of Fisheries, Govt. of Jammu & Kishmir, 29 September.

Tuticorin :

Shri M. R. Nair, Director, CIFT.

Shri Vibhakar Sharma, IPS, Superintendent of Police, Tirunelveli.

Shri G. Venkatesan, Deputy Director, MPEDA, Machilipatnam.

Capt. A. Almeida, M/s. Pereira Roche & Co, Tuticorin.

Shri Subadra Menon, Department of Biology, University of Delhi.

Shri Ramachandran, Chief Engineer (Operation), T & C, Tuticorin.

Shri Charles Angell, BOBP, Madras.

Shri K. K. Kaul, Deputy Commandant, CISF, Tuticorin Port Trust.

Shri K. V. Balakrishnan, General Manager, Southern Railway, Madras.

Dr B. T. Antony Raja, Consultant, BOBP, Madras.

Shri N. K. Vasudevan, Principal, Fisheries Staff Training Institute, Madras with 9 trainees.

Shri D. R. Joel, Fisheries College, Tuticorin with 15 B.Sc. students.

Shri C. D. Sethi, Department of Zoology, Holy Cross College, Trichy with 50 students.

Kakinada :

CIFE Postgraduate trainees accompanied by S/Shri A. K. Sharma, S. S. H. Rizini, C. Venugopalam and Dr W. S. Larka.

Madras :

Prof Frank J. Schwartz, Institute of Marine Sciences, University of North Carolina.

Dr Varaprasada Rao, IAS, Sub-Collector, Chinglepet.

Mandapam Camp :

Shri M. R. Nair, Director, CIFT.

Dr Charles L. Angell, FAO, BOBP, Madras.

Dr Geoffrey R. Ames, Principal Scientific Officer, Fish Section, Overseas Development Administration, Tropical Development and Research Institute, London.

Dr P. Reyntynes, FAO, BOBP, Madras.

Dr L. J. De Souza, 27, Sterling Road, Madras.

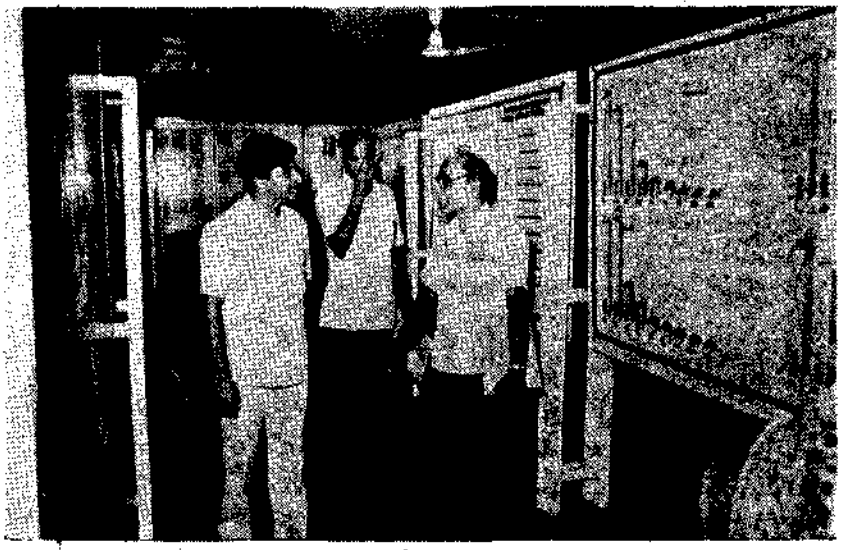
Calicut :

Shri A. S. Rose, Chairman, National Shipping Board.

KVK Programmes

The Krishi Vigyan Kendra conducted four training courses of 5-day duration benefitting 33 farm women and 27 farm men. Seventeen farm women were trained in health and hygiene utilizing the services of the health inspector of the local primary health centre. One day

Shri Nilamani Das, Minister for Agriculture, Govt. of Assam, accompanied by Shri Hrishbhaben Bharati, M.L.A and Vice Chairman, Advisory Council for BC Welfare visited CMFRI, Cochin on 21 September



Dr N. A. Jan, Director of Fisheries, Govt. of Jammu and Kashmir visited CMFRI, Cochin on 29 September

training programmes were also conducted in fruit preservation, social forestry, vegetable cultivation and poultry farming under which a total of 91 persons were trained.

Engagements

Dr P. S. B. R. James, Director attended the following meetings.

The Second National Fish Seed Congress and Co-chaired the session on Shellfish breeding at Calcutta, 3 July.

ICAR Regional Committee No. VIII meeting at IIHR, Bangalore, 17-18 July.

Futurology workshop to identify the S & T input for Lakshadweep up to 2005 AD at Regional Research Laboratory, Trivandrum and presented a paper on Scope for Marine Fisheries Research in Lakshadweep, 21-22 July.

First meeting of the High Power Committee on Management of Marine Fishery Resources at New Delhi, 29 August.

Shri K. A. Narasimham, Scientist S-3, participated as a member of the study team constituted by ICAR to tour the flood affected areas of Andhra Pradesh and report on technical inputs required by fish farms.

Dr S. Ramamurthy, Scientist S 3, attended the meeting of the Madras Base Advisory Committee of Fishery Survey of India, 18 August.

Dr M. M. Thomas, Officer-in-Charge, KVK, attended the monthly workshop of the Kerala Agricultural Extension programmes during July, August and September. Dr Thomas also attended the Farmers' meet organised by MPEDA and the State Bank of Travancore at Ernakulam, 25 September.

Deputation Abroad

ACIAR WORKSHOP ON SEA BASS AT DARWIN - Dr James and Dr Kasim Participated

Dr P. S. B. R. James, Director and Dr H. Mohammed Kasim, Scientist participated in the international workshop on the management of wild and cultured sea bass, *Lates calcarifer* organised by the Australian Centre for International Agricultural Research at Darwin during 25-30 September. The sea bass which is commonly known as 'barramundi', meaning big-scaled fish, is of considerable importance to the local people and aborigins of Australia in their day to day life as seen from the paintings in oberi rocks which are considered to be 20,000 years old. This commercially and recreationally important species is limited in distribution in the Indo-Pacific region. This workshop was organised with a view to gather information on biology and culture of this species. Fortysix Scientists from 10 countries namely, India, Burma, Thailand, Indonesia, Malaysia, Singapore, Philippines, Papua New Guinea, Thahiti and Australia participated. Fifty research papers were presented for discussion including two research papers dealing with the present status of the knowledge of biology and culture of sea bass in India by Dr P. S. B. R. James and Shri R. Marichamy and taxonomy, distribution and fishery of sea bass in India by Dr H. Mohamad Kasim and Dr James. The workshop was inaugurated by the Minister for Ports and Fisheries Mr. Nick Dondas MLA .The proceedings were divided into nine major topics covering wild stock fishery of past and present, management, biology, culture, pathology, nutrition breeding in captivity and socio-economics. "The participation in the workshop was very useful and gave us an opportunity to assess the present status of *Lates calcarifer* fishery in India" say Dr James and Dr Kasim who were deputed by ICAR to attend the workshop.

Dr James and Dr Kasim, on their way back, visited the Primary Production Department at Singapore and saw the culture and hatchery programmes. The cage culture of *Epinephelus* spp and *Lates calcarifer* have been developed into an industry in Singapore.

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Shri K. Devarajan, Scientist S-2, Deputed to undergo Second-short term Training course on small-scale shrimp hatchery/ nursery operations and management organised by the Network of Aquaculture Centres of Asia at Iloio, Philippines, 4 August - 30 September.

Dr P. Bensam, Scientist S-2, and Dr P. Nammalwar, Scientist S-2, were deputed for training course on net cage culture of marine fin-fish in coastal waters organised by FAO at Singapore, 1 Sept to 11 October.

Appointments

Shri R. Sundar as S.S. Grade I (Fieldman) at Madras, 20 August.

Shri R. Vasu as S.S. Grade I (Fieldman) at Madras, 21 August.

Shri K. G. Baby, Deckhand on Ad-hoc basis reverted and appointed as S.S. Grade I (Fieldman) as requested for by him.

Shri M. P. Lakshmanan, Superintendent as Assistant Administrative Officer at Mandapam Camp, 11 August.

Transfers

The following Scientists S-1 have been transferred from CMFRI Headquarters.

Kum. M. P. Molly to Calicut.

Dr Ranjit Singh to Veraval.

Shri Bipin Bihari to Mangalore.

Shri P. U. Zachariah to Mangalore.

Shri Sunil Kumar Mohamed to Mangalore.

Shri Abhay Kant Pathak to Veraval.

Shri Manas Kumar Bandhyopadhyay to Kakinada.

Shri C. Gopal to Visakhapatnam.

Shri M. Feroz Khan to Calicut.

Miss P. T. Sarada to Calicut.

Shri P. Jayasankar to Mandapam Camp.

Shri K. K. Philipose to Vizhinjam.

Miss S. Jasmine to Vizhinjam

Shri P. K. Asokan to Karwar.

Shri P. K. Krishna Kumar to Karwar.

Shri Veerendra Veer Singh to Bombay.

Shri Ravikumar Fotedar to Veraval.

Shri G. Maheswarudu to Mandapam Camp.

Smt. Rani Palaniswamy to Tuticorin.

Dr J. Divakar Ambrose to Mandapam Camp.

Shri U. Alagamalai, Deckhand (T-1) from Cochin to Madras.

Shri G. Sreenivasan, Junior Technical Assistant (T-2) from Tuticorin to Madras.

Shri M. Selvaraj, Technical Assistant (T-1-3) from Mandapam Camp to Tuticorin.

Shri A. Agastheesa Pillai Mudaliar, Senior Technical Assistant (T-4) from Madras to Pattukottai.

Shri A. Ganapathy, Technical Assistant (T-II-3) from Pattukottai to Mandapam Camp.

Shri S. Subramani, Technical Assistant (T-I-3) from Mandapam Camp to Madras.

Shri V. Maria Alwaris, Deckhand Senior (T-2) from Cochin to Tuticorin.

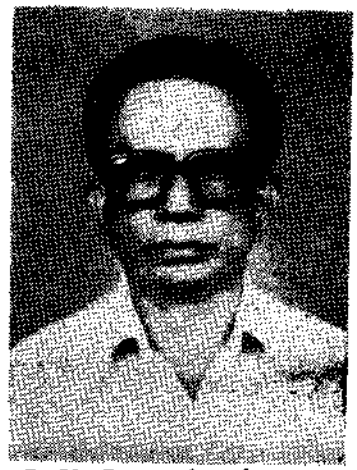
Reliefs

Shri Vasant D. Naik, S. S. Grade I (Watchman) on resignation, 10 March.

Shri Devidas Y. Naik, Field Assistant (T-1) on resignation, 25 August.

Shri A. L. Jadhav, S.S. Grade I (Watchman) on resignation, 28 August.

Retirements



Dr P. V. Ramachandran Nair

Dr P. V. Ramachandran Nair, Senior Scientist and Joint Director of CMFRI retired from the services of ICAR on 31 July on superannuation.

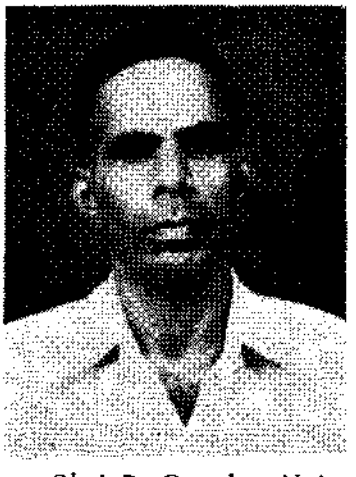
Dr Nair who joined CMFRI in 1956 was associated throughout his carrier with Fishery Environment Management Division as Research Assistant, Assistant Research Officer, Junior Fishery Scientist, Senior Fishery Scientist and finally as the Head of the Division. Initially he worked with Dr R. Raghu Prasad on the primary productivity of seas around India and was involved in pioneering researches using C14 technique in Indian waters. Dr Nair has participated in several cruises of International Indian Ocean Expedition. In association with Dr S. Jones Dr Prasad and Dr S. K. Banerjee he has contributed significantly in estimating the potential fishery resources of seas around India. Dr Nair has made several contributions to the development of the research activities of CMFRI which include building up of teams of scientists for projects such as isolation and mass culture of unicellular algae; marine pollution in relation to protection of living resources and remote sensing in relation to fisheries and has published several papers. He has been the guide for a number of scholars for their Ph.D. work. Dr Nair is one of the founder members of Marine Biological Association of India in which he held the office of the Secretary for more than 10 years.

Prior to joining CMFRI Dr Nair was teaching in Sri Lanka for a brief period. His basic degree is M.Sc. by research on phytoplankton from Kerala University. He was awarded the Doctorate degree by the Cochin University in 1974. for his work on primary productivity. He underwent training in advanced marine biology at Denmark and worked with Prof. Steemann Nielsen for some time. He also attended the FAO/SIDA workshop on Marine Pollution in relation to protection of living resources, held in Stockholm in 1973. Dr Nair was officer-in-charge of the research vessels, mobile laboratory and Department vehicles of CMFRI for a number of years. Dr Nair has served in a number of official committees constituted at the Institute and has also as Member/examiner in the selection committees and board of examiners of different Universities.

Shri V. Balan

Shri V. Balan, Scientist S-3 at CMFRI retired on 30 August on superannuation. Shri Balan joined the Calicut Research Centre in 1958 as Research Assistant and held the positions of Assistant Research Officer, Junior Research Officer, Scientist S-2 and S-3.

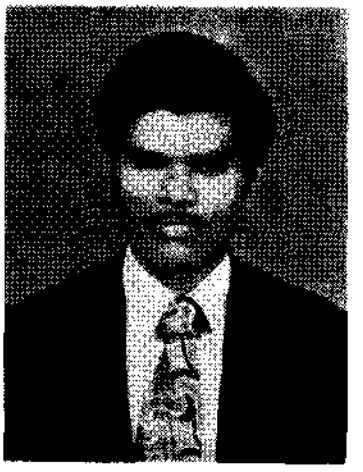
Shri Balan has made valuable contributions to marine fisheries research, his major areas of investigation being the fishery and biology of oil sardines and has published a detailed review on the subject covering about 40 years of work besides a number of papers.



Shri P. Gopalan Nair

Shri P. Gopalan Nair, S. S. Grade III (L.A.) retired on superannuation on 31 August.

Ph.D. Awarded



Shri K. Muniyandi

Shri K. Muniyandi, Technical Assistant at Mandapam has been awarded Ph.D. in Marine Biology by the Annamalai University for his studies on the mangrove of Pichavaram, southeast coast of India. Shri Muniyandi worked under the guidance of Prof R. Natarajan, CAS in Marine Biology, Parangipettai.

Shri K. A. Narasimham, Scientist S-3 at Kakinada, has been awarded Ph.D. in Zoology by the Andhra University for his thesis entitled Studies on Some Aspects of Biology and Fishery of the Blood Clam *Anadara* (Tegillarca) *granosa* (Linnaeus, 1958) and *A* (T) *rhombea* (Born 1780) from Kakinada Bay. Shri Narasimham carried out his work under the supervision of Dr E. G. Silas.

Weddings

Kumari S. Sarada, Junior Clerk at Tuticorin, married Shri M. Singarayar, 15 September.

"JHANDA OONCHA RAHE HAMARA....." Dr PSBR James Director, CMFRI hoisting the National Flag on the Independence Day.

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