

वार्षिक रिपोर्ट
Annual
REPORT

1997-'98



**CENTRAL INSTITUTE OF
FISHERIES TECHNOLOGY**
(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)



Annual Report 1997 - '98



CENTRAL INSTITUTE OF FISHERIES TECHNOLOGY

(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)

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PREFACE

The Central Institute of Fisheries Technology, one of the seven premier research institutes for fisheries under the Indian Council of Agricultural Research, undertakes basic and applied research to address the problems related to a wide spectrum of marine and inland fisheries activities in relation to the global scenario.

The research programmes of the Institute aim at solving technological problems of the fishery industry in the country. This report contains information on the various research and development, extension and educational activities pertaining to fishing, fish processing and allied subjects. The important areas covered include resource conservation and fuel efficient fishing, exploitation of deep sea resources, utilisation of fishery wastes, value addition in fish and fishery products, development of electronic equipments for harvest and post harvest technology of fish and so on.

The Institute has received external financial assistance through ad-hoc research projects sponsored by ICAR and other agencies. Funds for infrastructure development are also generated through revolving fund schemes and technical consultancy programmes approved by the Council.

The Institute has also embarked upon educating the processor on the HACCP (Hazard Analysis Critical Control Point) concept as a most efficient system of combating food safety problems. It is a matter of pride that the Government of India has entrusted the Institute with the task of processing plant inspection, water, ice and raw material certification and inter laboratory calibration for the development of the industry. I am also happy to state that the Supervisory Audit Team (SAT) which finally recommends approval of seafood processing plants for export to the European Union is comprised exclusively of CIFT experts.

On 17 July 1997, Dr R. S. Paroda, Director General, ICAR inaugurated the ARIS Cell of the Institute. On the same day, the D. G. also inaugurated the CIFT Guest House.

It gives me great pleasure to release the Annual Report of the Institute for the year 1997-98, the first since I took over as Acting Director of the Institute from Dr K. Gopakumar who took charge as Deputy Director General (Fisheries), ICAR on 21 November 1997.

(Dr. K. RAVINDRAN)

DIRECTOR

Executive Summary

Steady progress was maintained in the R & D activities of the Institute during the year.

A 20 m two seam large mesh sputnik trawl was introduced in Veraval waters.

Post larval and juvenile forms of fish and prawn were found escaping more from nets with 40 mm square mesh cod end compared to 20 and 30 mm mesh cod ends.

Steel conforming to IS: 226 and IS : 2062 can be considered as near substitute to IS:3039 steel for structural application in seawater.

About 20% fuel efficiency was obtained with the improved nozzle propeller developed at the Institute.

Basic parameters and general arrangement of a new series of 18 m fuel efficient deep sea trawler and gill netter-cum-longliner were standardised.

Standard procedures were developed for preparing battered and breaded products from fish and shell fish, smoked and canned products from farmed varieties as well as curries and chutney powders incorporating crab meat.

Technology was standardised for upgradation of jawala (*Acetes* sp) for human consumption.

Squilla (Oratosquilla nepa) has been identified as a suitable substitute for prawn shell waste for preparation of chitin / chitosan.

An HACCP plan for production of frozen ribbon fish as whole, steak and as fillets was standardised.

Incorporation of 3% sodium chloride in ice was found to increase the shelf life of market fresh fish from seven to ten days.

The K-value of good quality mackerel was found to be in the range 45 - 55 %.

The mortality rate of crabs packed in corrugated fibre board boxes containing moist saw dust mixed with citric acid was low compared to that packed in wood shaving, cotton or coir fibre.

Suitable packagings were identified for dried headless barracuda.

Liver tissue of *Chanos chanos* and *Mugil cephalus* was found to be a good source of chitinase activity.

Preliminary trials with composite collagen - chitosan film prepared from fish air bladder on human volunteers as artificial skin have given encouraging results.

Optimum growth temperature of five marine species of pathogenic Vibrios, namely, *V. parahaemolyticus*, *V. alginolyticus*, *V. mimicus*, *V. vulnificus* and *V. harveyi* was found to be 37°C.

An inexpensive chamber type PVC solar dryer was developed for hygienic dehydration of thelly chemmeen (*Metapenaeus dobsoni*) and jawala shrimp (*Acetes* sp.).

Development of a high speed log with range upto 20 knots was completed and a remote operated multi-channel soil moisture meter fabricated.



Introduction

BACKGROUND

The Central Institute of Fisheries Technology, named at the time of its inception as Central Fisheries Technological Research Station was set up in 1954 following the recommendations of a high power committee constituted by the Ministry of Food and Agriculture, Government of India. It started functioning at Cochin in 1957 under the Department of Agriculture of the then Ministry of Food and Agriculture with a small nucleus of staff for research work in fishing craft and gear. The Processing Division of the Institute was started in 1958 and the Extension, Information and Statistics Division in 1961. The Institute was given its present name in 1962. The administrative control of the Institute was brought under the Indian Council of Agricultural Research from 1 October, 1967.

The Institute is the only national centre in the country where research in all disciplines relating to fishing and fish processing is undertaken. Research Centres function at Veraval (Gujarat), Visakhapatnam (Andhra Pradesh), Burla (Orissa), Mumbai (Maharashtra), Calicut (Kerala) and Hoshangabad (Madhya Pradesh).

MANDATE

The Institute functions with the following mandate :

- To evolve innovative and cost-effective technologies for fish harvest.
- To develop and standardise various aspects of post-harvest technologies.
- To develop technologies for extraction of biomedical, pharmaceutical and industrial products from aquatic organisms.
- To act as a repository of information on harvest and post-harvest technologies with a systematic data base.
- To conduct transfer of technology through training, education, and extension education programmes.
- To provide consultancy services and to popularise the innovations for the overall development of fishery industry.

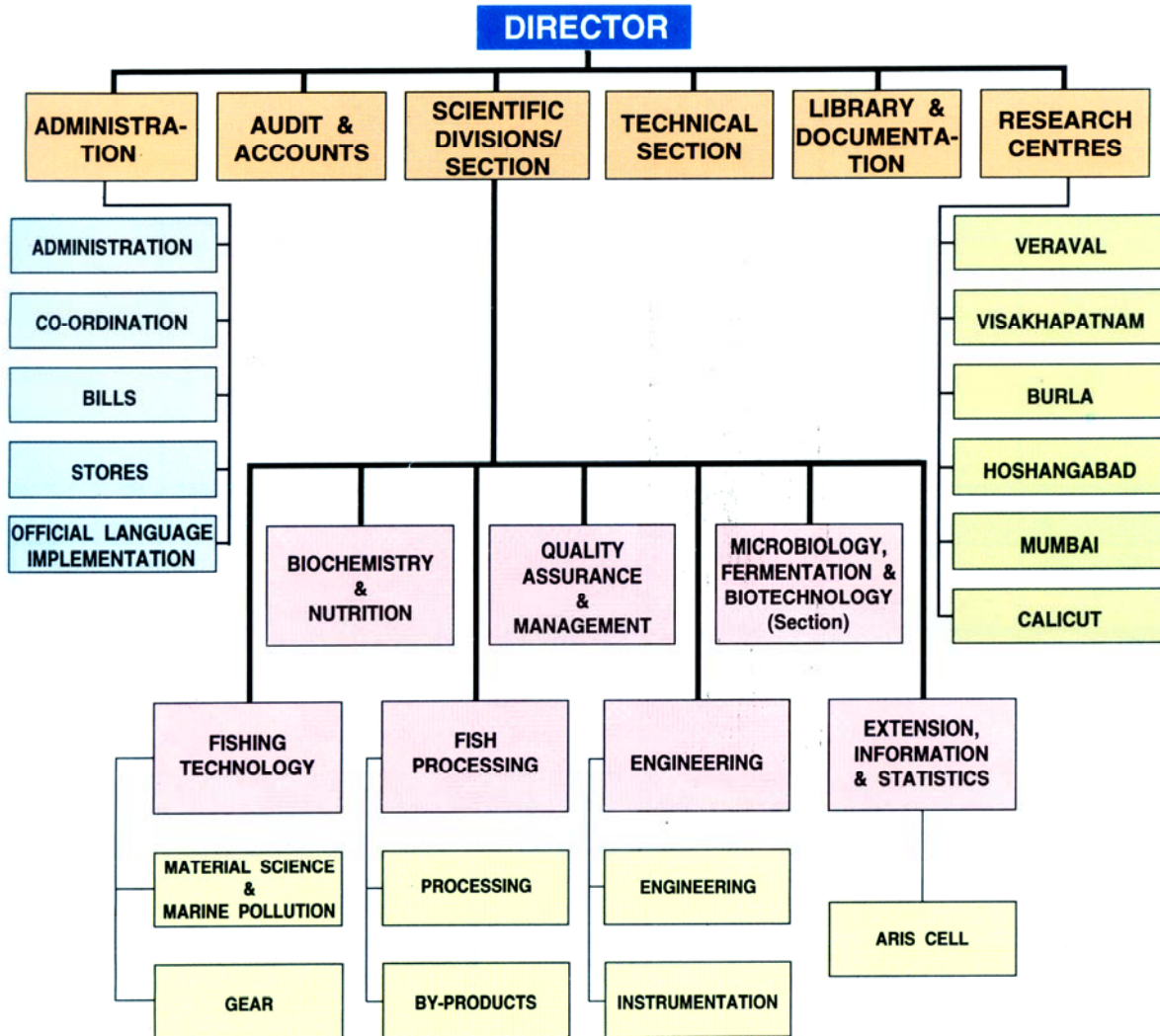
ORGANISATION AND STRUCTURE

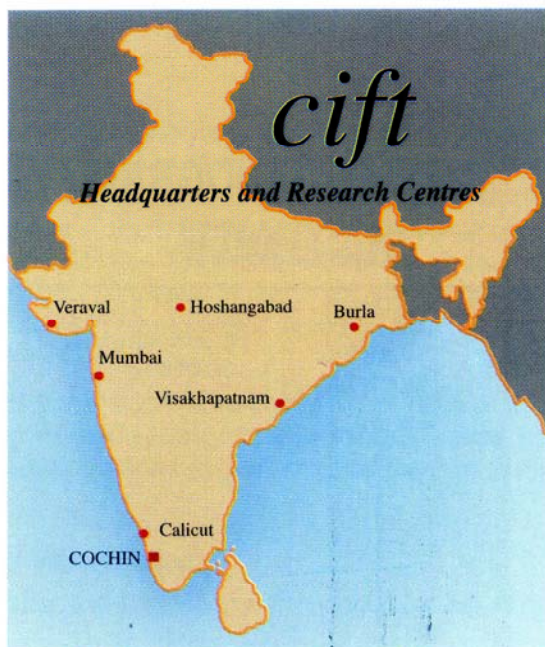
The Director heads the Institute. With him are vested all administrative and financial powers regarding research and management of the Institute. The Director is assisted by a Senior Administrative Officer, an Administrative Officer and two Assistant Administrative Officers for dealing with matters relating to general administration and an Assistant Finance & Accounts Officer for looking after financial accounting aspects as well as internal audit of the Institute. One Technical Officer attends to the technical matters including those connected with research projects handled by the Institute.

Research work of the Institute is carried out in the following Research Divisions/Section:

1. Fishing Technology Division
2. Fish Processing Division
3. Biochemistry & Nutrition Division
4. Quality Assurance & Management Division
5. Engineering Division
6. Extension, Information & Statistics Division
7. Microbiology, Fermentation & Biotechnology Section

CIFT ORGANOGRAM





CIFT Headquarters and Research Centres

Place	Address	Telephone number	Fax/Telex/E-mail	Telegram
Headquarters, COCHIN	Matsyapuri P.O. Cochin - 682 029 KERALA	0484 - 666845 (5 lines)	Fax : 091-484-668212 Telex : 0885-6440 CIFT IN E-mail : cift@X400.nicw.nic.in	Matsyaoudyogiki/ Fishtech
VERAVAL	Research Centre of CIFT Matsya Bhavan, Bhidia plot Veraval - 362 269, GUJARAT	02876- 20297	Fax : 02876-41576	Matsyaoudyogiki
VISAKHAPATNAM	Research Centre of CIFT Ocean View Layout Pandurangapuram Andhra University P.O. Visakhapatnam- 530 003 ANDHRA PRADESH	0891-567040	Fax: 0891-567040	Matsyaoudyogiki
BURLA	Research Centre of CIFT Burla - 768 017, ORISSA	0663-430419	Telex : 0634-211 CIFT IN	Matsyaoudyogiki
MUMBAI	Research Centre of CIFT CIDCO Administrative Bldg. (Ground Floor), Sector I, Vashi, Mumbai - 400 703 MAHARASHTRA	022-7826017	Telex : 0131-1221 CIFT IN	Fishtech Fishprocess (FT)
CALICUT	Research Centre of CIFT Beach Road, West Hill Calicut - 673 005, KERALA	0495-50627	Nil	Matsyaoudyogiki
HOSHANGABAD	Research Centre of CIFT Kothi Bazar Hoshangabad - 461 001 MADHYA PRADESH	Nil	Nil	Fishtech/ Matsyaoudyogiki

A quick glance at past achievements

The Institute has all along laid stress on maximum utilization of the marine and inland resources and is striving towards self sufficiency. One important step taken in this direction has been the surveys conducted by the Institute with a view to exploiting the fishery resources - both demersal and semi-pelagic - on-board the DOD owned research vessel *Sagar Sampada*. So far the entire area from the North-West to North-East coast has been covered. Ten specialized nets, to name a few, high speed demersal trawl, hybrid trawl, high opening trawl and semi-pelagic trawl, have been designed to replace the imported nets presently being operated from this vessel. A large number of designs of various other types of gear like gill nets, purse seines, lines and traps have also been developed for exploitation of the fishery resources. Development of a combination wire rope for deep sea fishing - an import substitution - is another notable achievement.

Designs of mechanised wooden fishing vessels in the size range 7.67 - 15.25m OAL for smaller class vessels have been developed. The CIFT has also embarked upon designing large resource specific vessels of 20m OAL and above in order to meet the ever increasing demands of the country for exploiting the deep sea waters. Painting schedules and cost effective methods have been developed for protection of the crafts. Designs of fuel efficient vessels have also been developed and commercially adopted.

The Institute has also developed a number of electronic equipments for commercial fisheries, research as well as environmental studies. Some of them are trawl depth meter, solar processing monitor, environmental data acquisition system, freezer temperature monitor, warp load meter and salinity temperature meter.

Chlorination of water is normally practised to reduce bacterial contamination for which sodium chlorite is used. CIFT has developed a chlorine level indicator paper called cloritest for instant reading of chlorine level. Other products developed for the fish processing industry are antiseptic ointment for use by prawn handlers and deodorant for masking the foul odour emanating from processing plants.

Based on the shift in the demand of products and processing techniques, emphasis was shifted from block freezing of fish and shell fish to development of individual quick frozen products like battered and breaded products, including fish fingers, fish cutlet and fish sticks. A number of packagings for various types of fish products as well as technologies for transportation of live fish and shell fish have also been developed at the Institute.

The important value-added products developed by CIFT which are in demand at present within the country and abroad are fish wafers, fish soup powder, fish pickles and hygienically dried fish. Shark fins and fin rays are very costly commodities, process for extraction of which has been developed at the Institute. Other sophisticated items developed are masmin prepared after smoking having high demand in internal and external markets and squalene obtained from oils of certain species of sharks. Process has also been developed and commercialised for processing shark cartilage.

Suitable media for culture of different types of bacteria and methods for their enumeration and isolation have been developed.

Surgical sutures are presently imported incurring considerable expenditure to the country. The CIFT has successfully developed pharmacological products from fish waste, a noteworthy one being absorbable surgical sutures from fish gut collagen. Field trials with the product have been very encouraging. Two other important products from fish waste developed by the Institute are chitin and chitosan which have been adopted both in the national and international levels. Six national agencies and three international agencies have so far adopted this technology.

Transfer of technology through technical consultancy programmes is a major activity of the Institute. Many entrepreneurs have benefited by the services rendered by the Institute leading to establishment of a number of processing units for fish waste utilization and improvement in fish catch. Extension activities targeting the weaker sections of the community and rural women such as conduct of training courses, fisheries melas and exhibitions have also been organised.



Staff Position as on 31.12.1997

DIRECTOR

HEADQUARTERS - COCHIN	VERAVAL RESEARCH CENTRE	VISA KHAPATNAM RESEARCH CENTRE
Scientific	Scientific	Scientific
Head of Division 5	Principal Scientist 1	Principal Scientist 1
Principal Scientist 16	Senior Scientist 1	Senior Scientist 4
Senior Scientist 40	Scientist 8	Scientist (Sr Scale) 1
Scientist (Senior Scale) 5		Scientist 2
Scientist 5	Technical	Technical
Technical	T-7 (Technical Officer) 1	T-5 (Technical Officer) 2
T-9 (Technical Officer) 1	T-5 (Technical Officer) 3	T-4 2
T-8 (Technical Officer) 2	T-II-3 2	T-II-3 3
T-7 (Technical Officer) 1	T-I-3 4	T-I-3 8
T-6 (Technical Officer) 5	T-2 1	T-2 1
T-5 (Technical Officer) 14	T-1 2	T-1 1
T-4 6	Administrative	Administrative
T-II-3 29	Superintendent 1	Assistant 1
T-I-3 24	Stenographer 1	Stenographer 1
T-2 12	Senior Clerk 3	Senior Clerk 1
T-1 22	Junior Clerk 1	Junior Clerk 2
Administrative	Auxiliary 2	Supporting
Sr. Administrative Officer 1	Supporting	Supporting Staff Gr. IV 2
Administrative Officer 1	Supporting Staff Gr. IV 1	Supporting Staff Gr. III 5
Asst. Finance & Accts. Officer 1	Supporting Staff Gr. II 6	Supporting Staff Gr. II 7
Asst. Director (O.L.) 1	Supporting Staff Gr. I 9	Supporting Staff Gr. I 1
Asst. Admn. Officer 2	BURLA RESEARCH CENTRE	MUMBAI RESEARCH CENTRE
Superintendent 6	Scientific	Scientific
Senior Stenographer 1	Senior Scientist 3	Senior Scientist 2
Assistant 10	Technical	Technical
Stenographer 7	T-5 (Technical Officer) 1	T-4 2
Junior Stenographer 2	T-4 2	T-1 1
Senior Clerk 20	T-II-3 1	Administrative
Junior Clerk 25	T-I-3 4	Assistant 2
Auxiliary 4	T-2 1	Junior Clerk 1
Administrative Non-Ministerial 1	T-1 1	Supporting
Supporting	Administrative	Supporting Staff Gr. III 1
Supporting Staff Gr. IV 6	Assistant 1	Supporting Staff Gr. II 3
Supporting Staff Gr. III 13	Junior Clerk 2	Supporting Staff Gr. I 2
Supporting Staff Gr. II 16	Supporting	
Supporting Staff Gr. I 13	Supporting Staff Gr. IV 4	
	Supporting Staff Gr. III 3	
	Supporting Staff Gr. II 6	
	Supporting Staff Gr. I 5	

CALICUT RESEARCH CENTRE**Scientific**

Senior Scientist	1
Scientist	1

Technical

T-II-3	2
T-I-3	1
T-1	2

Administrative

Assistant	1
Senior Clerk	1

Supporting

Supporting Staff Gr. III	1
Supporting Staff Gr. II	1
Supporting Staff Gr. I	2

HOSHANGABAD RESEARCH CENTRE**Scientific**

Scientist	1
-----------	---

Technical

T-6 (Technical Officer)	1
-------------------------	---

Administrative

Senior Clerk	1
--------------	---

Supporting

Supporting Staff Gr. III	1
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Budget expenditure statement for the year 1997-98

(Rs. in lakhs)

Sl No.	Particulars	NON-PLAN			PLAN		
		Budget Estimate	Revised Estimate	Expenditure	Budget Estimate	Revised Estimate	Expenditure
01.	Establishment Charges	390.30	484.30	459.12	5.00	1.50	0.98
02.	Travelling Allowance	5.00	7.05	7.05	1.50	2.00	2.00
03.	Other Charges	5.70	25.70	25.59	70.50	115.00	181.33
04.	Works	00.00	3.00	02.55	93.00	70.50	4.25
	TOTAL	401.00	520.05	494.31	170.00	189.00	188.56

RESEARCH ACHIEVEMENTS

HEADQUARTERS, COCHIN













Fishing Technology Division

Research Projects handled

1	Title of Project : Studies on the material conservation, environmental quality, ecosystem and the sustainable use of coastal zone of India Project Leader : Dr K. Ravindran Location of Project : Cochin Associates : Dr A. G. G. K. Pillai, Dr B. Meenakumari, Smt. Saly. N. Thomas, Smt. Leela Edwin
2	Title of Project : Management measures in trawling with reference to conservation and fuel saving Project Leader : Shri N. Subramonia Pillai Location of Project : Cochin & Visakhapatnam Associates at Cochin : Dr M. D. Varghese, Shri T. Joseph Mathai
3	Title of Project : Fishing techniques for migratory fishes Project Leader : Shri P. George Mathai Location of Project : Cochin Associates : Shri V. Vijayan, Shri N. Subramonia Pillai, Shri Percy Dawson, Smt. Saly, N. Thomas, Shri Braj Mohan
4	Title of Project : Investigations on demersal trawls for continental shelf and slope Project Leader : Shri K. K. Kunjipalu Location of Project : Cochin, Visakhapatnam & Veraval Associates at Cochin : Dr M. R. Boopendranath, Dr B. Meenakumari, Shri T. Joseph Mathai, Shri R. S. Manoharadoss, Dr S. Balasubramaniam
5	Title of Project : Development of resource specific trawl gear system and assessment of commercial trawling practices Project Leader : Shri V. Vijayan Location of Project : Cochin, Veraval & Visakhapatnam Associates at Cochin : Dr M. D. Varghese, Shri P. George Mathai, Shri Percy Dawson, Shri R. S. Manoharadoss, Shri K. Ramakrishnan
6	Title of Project : Harvest Technologies – Assessment of marine living resources on board <i>FORV Sagar Sampada</i> Project Leader : Dr. K. Ravindran Location of Project : Cochin



CHIEF FINDINGS

-  Developed mathematical models of corrosion of three important ocean engineering alloys viz. aluminium, copper and iron in Cochin harbour waters with reference to rate factors to predict corrosion rate for design purposes.
-  Steel conforming to IS:226 and IS:2062 can be considered as a near substitute to IS:3039 steel for structural application in sea water.
-  Thickness profile as a result of growth of fouling organisms on the hull of fishing boats averaged to 36 mm in 8 months.
-  Studies on wood preservatives viz. CCA, creosote and dual treatment in the laboratory showed that leaching of copper, arsenic and chromium salt is in the same order. Comparative evaluation of these preservatives in soil burial test showed no fungal or termite attack in CCA and dual treatment after 3 years.
-  Bioactive compounds extracted from sponges *Dysidea herbacea*, *Clathria frondifera* and *Callyspongia* sp. were found to resist the settlement of larvae of tube worm *Hydroides elegans*.
-  Post-larval form of fishes, juveniles and prawns were found escaping more from 40 mm square mesh cod end when compared to 20 mm and 30 mm sizes.
-  Prototype evaluation of 28m semi-pelagic trawl showed efficiency in exploiting off bottom resources with a CPUE of 14 kg.
-  1350 X 1000 mm high aspect ratio suberkrub otter boards in combination with 18 m 8P semi-pelagic trawl with 20 m double bridles showed efficiency in catching target species.
-  Cod end mesh size showed no elongation after 32 hauls when measured randomly using ICES pressure gauge.
-  The BRD (by-catch reduction device) fitted in trawl nets showed no reduction in shrimp catch when compared to control net.
-  Cod end mesh selectivity studies on stake nets showed *Metapenaeus dobsoni* dominating the catch.
-  Deep sea gill netting with polyethylene and nylon nets showed more catch in nylon nets.

Report of work done

Fishing craft

The corrosion rates of 5000 series of aluminium, marine quality copper and marine steel exposed in Cochin harbour waters were measured periodically. Based on the results, the mathematical models of corrosion of these metals were developed.

Field exposure tests of steel conforming to IS: 226, IS:2062, IS:3039 and two grades of Lloyds steel carried out during monsoon and post monsoon period have shown that steel conforming to IS:226 and IS:2062 can be considered as a near substitute to IS:3039 steel for structural application in sea water. Steel with IS: 3039 marking is also found comparable with Lloyds steel.

The fouling complex on the hull of fishing boats was studied during the period. The thickness profile

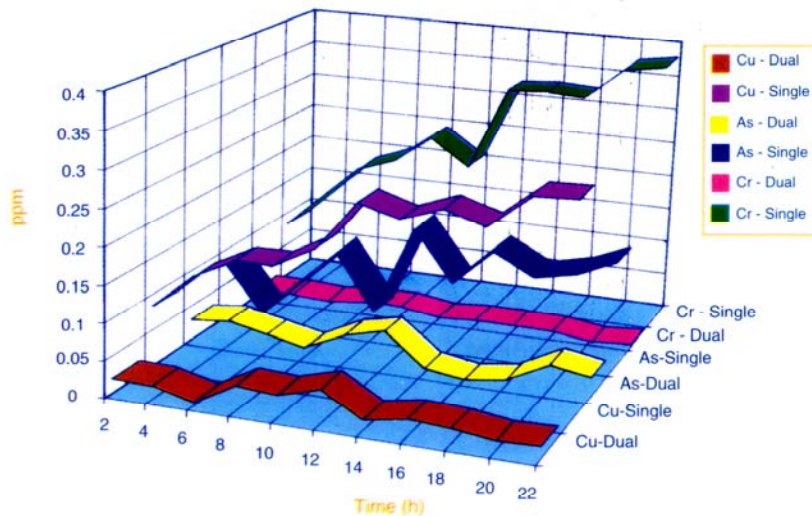
as a result of the growth of the fouling organisms averaged to 36 mm in 8 months.

In order to predict corrosion rate of metals with reference to environmental variables, copper, steel and stainless steel are being field tested and studied.

Studies were carried out to find out the suitability of rubber wood (*Hevea brasiliensis*) for marine application. Samples of wood treated with preservatives developed at CIFT (arsenical creosote, creoscor, copper creosote and dual treatment) were seasoned and exposed to soil, sea water and atmospheric conditions.

Assessment of marine debris in Cochin back-water was attempted. Preliminary survey showed that plastics dominated the debris. Monitoring of water and sediment quality parameters from selected aquaculture ponds and harbour systems to record the physical, chemical and biological parameters was continued.

Leaching of Cu, Cr and As from preservative treated *Hevea brasiliensis*



Fishing gear

Field testing of square mesh cod ends of size 20, 30 and 40 mm was carried out to assess the cod end mesh selectivity. Post-larval forms and juveniles were found escaping more from 40 mm square mesh cod end when compared to 20 mm and 30 mm sizes.

Morphometric parameters of important commercial species of fish caught from FORV *Sagar Sampada* were recorded.

A survey along the north Malabar coast (Kannur and Kasaragod) have shown that CIFT designed high opening trawls supplied during a training programme conducted at Kannur in 1987 have been widely adopted by the local fishermen.

Studies on 22 m and 32 m designs of semi-balloon trawls were completed and the results obtained, tabulated and analysed.

Prototype evaluation of 18m RMT 8P semi-pelagic trawl was taken up in combination with 1407 X 982 mm polyvalent otter board rigged with double bridles of 20 m length. Semi-pelagic species like *Pampus* sp., *Leiognathus* sp., juveniles of *Scomberomorus* sp., carangids and horse mackerel dominated the catch. The CPUE worked out was 14.0 kg.

High aspect ratio suberkrub otter board of specification 1350 X 1000 mm was experimented in combination with 18 m RMP 8P semi-pelagic trawl with 20 m bridles. The results of 17 hauls taken showed CPUE of 28.7 kg with 5.5% of catch consisting of quality fishes like pomfrets, mackerel and seer.

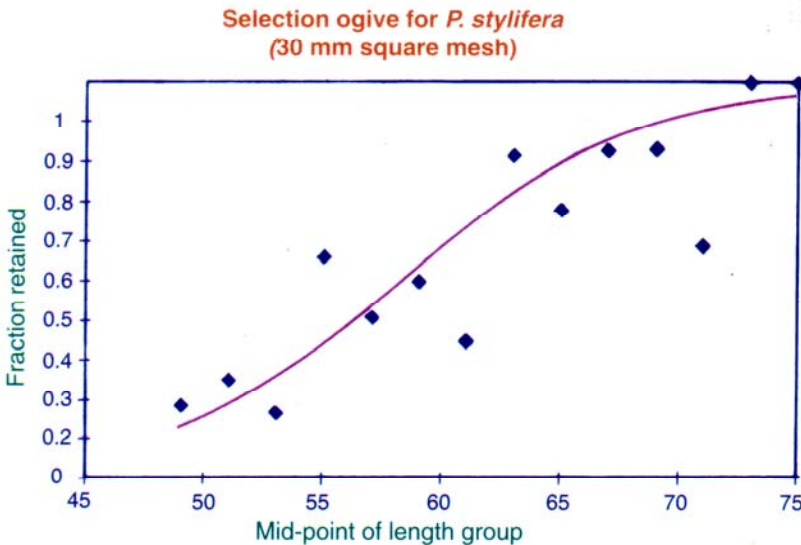
Two types of selective grids, an elliptical shaped (110 X 80 cm) and rectangular (90 X 60 cm) were developed as by-catch reduction device (BRD). Experiments with these devices showed no significant reduction in shrimp catch in the experimental net fitted with BRD when compared to control net. A 10-15% reduction in fish catch was however noticed. There was no significant reduction in jelly fish caught in the net. Fishing trials were also carried out with the newly developed by-catch reduction device, the 'Fish eye'.



Fish eye attachment to cod end for reduction of by-catch

Shrimp trawl and fish trawl of 31.6m head rope were fabricated with 20 and 30 mm square mesh cod ends with covers. Two pairs of 'V' form vertically curved otter boards were also fabricated. Data on selectivity of the cod ends are being collected for fish/prawn. It was found that percentage of escapement was more in 30 mm square mesh than 30 mm diamond mesh. The extensibility of mesh size in trawl after field operations was measured using ICES pressure gauge and it is found that the elongation is negligible after 32 hauls.

Codend mesh selectivity studies on stake nets was continued and morphometric data collected. Study on species composition showed *M.dobsoni* as the dominant species followed by *P.indicus* and *M.monoceros*. PE and nylon gill nets of size 110-140 were used for deep sea gill netting. Catch was more in nylon nets.


















Fish Processing Division

Research Projects handled

- | | |
|---------------------------|---|
| 1 Title of Project | : Development of environment friendly feed for <i>M. rosenbergi</i>, ornamental fishes, catfishes (<i>Clarias garipenase</i> and <i>C. batrachus</i>) and other fishes |
| Project Leader | : Dr P. T. Mathew |
| Location of Project | : Cochin |
| Associates | : Dr K. G. Ramachandran Nair, Dr Jose Stephen, (Suseela Jose) |
| 2 Title of Project | : Development of viable technologies for the utilisation of crustacean wastes, fishery by-products and sea weeds. |
| Project Leader | : Dr K. G. Ramachandran Nair |
| Location of Project | : Cochin |
| Associates | : Shri P. Madhavan, Dr Chinnamma George, Dr P. T. Mathew, Dr. T.K. Thankappan, Smt. R. Thankamma |
| 3 Title of Project | : Post harvest technology of crabs with special reference to value added products from crab meat. |
| Project Leader | : Dr Chinnamma George |
| Location of Project | : Cochin |
| Associates | : Dr Jose Stephen, Dr. T. K. Srinivasa Gopal, Shri J. Selvin, Shri Thanseem Ismail |
| 4 Title of Project | : Processing and product development from cultured and deep sea fish and shellfish |
| Project Leader | : Dr Jose Joseph |
| Location of Project | : Cochin |
| Associates | : Shri V. Muraleedharan, Shri P. A. Perigreen, Shri A. C. Joseph, Shri K.K. Balachandran, Shri P. K. Vijayan, Shri K. P. Antony, Smt. R. Thankamma, Dr T. S. G. Iyer, Shri T. V. Sankar |
| 5 Title of Project | : Appropriate packaging for fish and fish products |
| Project Leader | : Dr T. K. Srinivasa Gopal |
| Location of Project | : Cochin |
| Associates | : Shri K. K. Balachandran, Shri V. N. Nambiar, Shri P. Madhavan, Shri K.P. Antony, Shri P. K. Vijayan, Smt. R. Thankamma, Shri A. C. Joseph, Shri A.V. Shenoy, Shri P. Ravindranathan Nair. |



CHIEF FINDINGS

-  Standardised the procedure for preparation of frozen IQF prawn as whole and headless.
-  Developed and standardised the procedure for preparation of battered and breaded products from cultured *Penaeus monodon* in butterfly, cooked, peeled and deveined and cooked, round tail-on form as well as their packaging and freezing for frozen storage.
-  Procedure was standardised for preparation of coated products from deep sea Kalawa (*Epinephelus* sp.).
-  Method was developed for improving the colour and texture of smoked and canned products prepared from farmed *Catla catla*.
-  Method of preparation of cured and dried products from shark was developed.
-  Feeding experiments on albino rats have revealed the growth retarding effect of chitosan.
-  Transparent films with uniform thickness were prepared from chitosan-gellan solution.
-  Whole dried squilla gave chitosan of higher viscosity than from deproteinized and dried squilla under identical conditions.
-  Eighty percent protein from prawn shell was recovered by hydrolysis using alcalase.
-  Recipe was formulated for soup using spray dried crab shell extract. The product had better nutritive value and flavour compared to the commercially available popular brands.
-  Common carps, mrigal and rohu, fed with formulated feeds containing 30% protein exhibited maximum growth rate compared to those fed with feeds containing 20% and 25% protein.
-  Methods were standardised for preparation of curries and chutney powder from crab meat.
-  Moist saw dust mixed with citric acid was seen to be a better packing material than cotton, wood shavings or coir fibre for live transport of crabs.
-  Processed and glazed IQF *Penaeus monodon* vacuum packed in 12 micron PEST/150 G LDPE as well as those packed in air after glazing was organoleptically sound even after 90 days storage, although those packed in air with glaze showed slight amount of dehydration. Those packed in air without glaze and vacuum were rejected due to poor organoleptic characteristics and high degree of dehydration.
-  Dried, headless barracuda packed in 12 micron PEST/150 G LDPE in vacuum had good organoleptic characteristics even after 120 days storage at ambient temperature compared to those packed in air.



Report of work done

Processing

Studies on the iced storage characteristics of *Penaeus monodon* collected from Mandapam were continued. Samples were frozen in headless form both in block and IQF style after one day iced storage. Samples were also frozen as IQF-HL after 4 and 7 days in ice.

All the samples were stored at -20°C for storage studies. Significant variation in sensory characteristics of all the samples was noticed by 8 months storage at -20°C. The samples frozen as block after one day iced storage was found better than the corresponding IQF samples. All the IQF samples showed dehydration and the intensity of dehydration increased proportional to the iced storage period. Similar trend was seen with sensory properties like texture, taste and odour.

Whole and headless *Penaeus monodon* were frozen in IQF form, glazed and packed in polyester laminated with low density polythene and stored at -20°C. By 3 months storage slight desiccation of the sample was noticed and the intensity of desiccation increased on further storage. Reglazing the sample prevented desiccation as long as there was a coating of ice on the surface of the material.

Battered and breaded products were prepared from *Penaeus monodon* in different forms such as butterfly, cooked peeled and deveined, and cooked round tail-on. Suitable batter combinations were developed by trial and error method for the above products. Procedures were developed for the preparation of single coated and double coated battered and breaded products. Different sizes of bread crumbs were also used to study the aesthetic appeal of the product.

Studies were conducted to prepare good quality battered and breaded Kalawa (*Epinephelus* sp.) fillets. Batter combinations and dilution of batter for single and double coating were standardised. The samples were stored at -20°C to study the storage behaviour of these products and assess the shelf life.

Canned product prepared from *Catla catla* fillets was found to be of unacceptable quality because of extremely soft texture. Studies were conducted on improving the texture and flavour of the product by partial drying and smoking. Procedures were developed to prepare smoked and canned *Catla catla* and their properties compared with *Catla catla* canned without smoking. Storage studies were also carried out and the effect of smoking on the lacquer and product quality studied.

Fish products and by-products

Chitosan in 0.5%, 1.0% and 1.5% level were incorporated in standard diets and fed to albino rats for 16 weeks along with control diet without chitosan. Animals fed on chitosan diets recorded decrease in weight gain with increase in chitosan content in the feed. The animals were healthy throughout the experimental feeding. Changes in other parameters are being examined.

Four percent solution of chitosan in 4% acetic acid was prepared and 2% gelatin was dissolved in it. After expulsion of air, the solution was spread uniformly on smooth steel plate, dried at 50°C, stabilized in

dilute sodium hydroxide solution and dried. The films were transparent and of uniform thickness.

As the demand for chitin and chitosan is on the increase, squilla, *Oratosquilla nepa*, a by-catch in prawn trawlers, was identified as an alternative raw material in place of prawn shell waste. Whole dried squilla and deproteinised dried squilla were used for production of chitin and chitosan. Whole dried squilla gave chitosan of higher viscosity than that from deproteinised dried squilla. Both materials are found to be good raw material for chitin/chitosan production.

Fresh shells of cultured tiger prawns were processed under controlled conditions to get chitosan of viscosity as high as 2800 cp (1.0% solution in 1.0% acetic acid) which is required for certain specialised applications.

Fish noodles were prepared using surimi from red snapper. The noodles were produced in the baby extruder used for shrimp feed production. The product was good and bacteriologically safe even after storage for 6 months at ambient temperature. It has a rehydration property 109% compared to 99% for a commercially popular brand. The protein content of the noodles was 25%.

Enzymatic hydrolysis was attempted to recover protein from prawn shell waste which will minimise the loss of nutritive value of the protein by alkaline or acid hydrolysis. During the study it was shown that alcalase enzyme is better than other proteolytic enzymes for hydrolysis of protein in prawn shell. Nearly 80% protein was recovered during the trials.

Three fish feed formulations having protein content 20, 25 and 30% were prepared using minimum quantity of fish meal and processed to water stable pellets in the baby extruder. The feeds were then subjected to tank feeding experiments prior to field trials with common carps, mrigal and rohu. The feed containing 30% protein was found to be the best and is now being tested in the instructional pond of Fisheries College, Panangad.

Ad-hoc project on post harvest technology of crabs

Experiments were conducted with crab – *Charybdis cruciata* – to study its amenability to freezing and storage but the shelf life was reduced considerably due to temperature fluctuation in the cold store. Results indicated slight reduction in the solubility of protein and moisture and slight drop in organoleptic score. Studies

on frozen stored *Portunus pelagicus* also showed a similar trend.

Experiments were continued on the ice storage studies of *Scylla serrata* ie. protein solubility and electrophoretic separation of protein. A clear separation could not be obtained. Extractability of myofibrillar protein decreased gradually with respect to the length of ice storage. Sarcoplasmic protein also showed the same trend, but the extent of loss was less. Leaching loss as well as denaturation of protein occurred during storage.

Detailed biochemical analysis of four commercially important species such as *P. pelagicus*, *P. sanguinolentus*, *Charybdis cruciata* and *C. lucifera* were carried out. *Podophthalmus* sp., which is not exploited for edible purpose because of its smaller size and low meat content, was subjected to proximate composition analysis. It compared well with other species of crabs.

Values obtained were in the following range - moisture content 80.07 to 83.33%, total nitrogen 2024 to 2569 mg %, fat content 0.69 to 1.2% (DWB), connective tissue 2.85 to 7.18 mg %, free amino nitrogen 205 to 365 mg %, carbohydrate 150 to 462 mg %, glycogen 54 to 155 mg %, ribose 67 to 171 mg %, fructose 9 to 25 mg %; phosphorus (inorganic) 64 to 217 mg %, sodium 189 to 362 mg % (DWB), potassium 82 to 140 mg % (DWB), calcium 32 to 104 mg % (DWB), copper 4 to 16 ppm, lead nil to 0.445 ppm and cadmium nil to 0.44 ppm.

The yield of chitin prepared from shells of four species of crabs varied between 5.04 and 5.84%. Body shell and claw shell were separately treated for chitin preparation in the case of *P. sanguinolentus* sp. The yield obtained was 5.76% for body shell and 5.22% for claw shell. Ash content was determined for each chitin sample. The values obtained were between 0.17 and 0.40% giving the indication of complete demineralisation.

Recipes were standardised for the preparation of four types of curries and chutney powder incorporating crab meat.

Crab meat picked and dried under controlled conditions was pulverised. Chutney was prepared with fried coconut gratings, black gram, pepper, chilli, onion, ginger, coriander, garlic, tamarind, asafoetida, clove, curry leaves, salt and crab meat powder. Panel members evaluated the product as excellent. Negligible change

in quality of the products was observed for a period upto 6 weeks if stored in dried glass bottles.



Meat picking of crabs

Live transportation of mud crabs

A series of experiments were conducted to study the life of crabs stored under different conditions. Crabs carefully packed in corrugated fibre board boxes containing moist saw dust mixed with citric acid, sealed and stored at atmospheric temperature remained for five days without any mortality, while crabs packed as above sealed and stored in a chamber maintaining a temperature of 22-24°C remained as such only for four days. Mortality rate was more in low temperature chamber.

Another series of experiments were conducted with different packing materials such as saw dust, wood shaving, cotton and coir fibre. The sealed cartons were then stored at 22-24°C. In the case of moist cotton all the animals died on the fourth day itself, in control, 100 % mortality occurred on the ninth day, in wood shavings on tenth day and in coir fibre on twelfth day. In moist saw dust, mortality started on the fourteenth day and on nineteenth day all the animals died. Average weight loss per day was minimum in saw dust (0.628 g%) and maximum in cotton (1.962 g%). Studies on the biochemical changes in meat during live storage are in progress.

Survey of the crab landing centres

Survey of the crab landing centres at Calicut, Malappuram and Trichur Districts, Vypeen, Cherai and Munambam in Ernakulam District, Aroor, Alleppey in Alleppey District, Neendakara, Sakthikulangara in Quilon District and Vizhinjam in Trivandrum District in Kerala

was carried out with a view to studying the availability of crabs in each area, methods and gear used for catching crabs, landing of crabs, processing methods employed in each area, and mode of export. In all places great demand was noticed for mud crab *Scylla* sp. Landing period was generally from November to May. Method of catching varied from place to place and species to species.

Packaging

Fresh tiger prawns (*Penaeus monodon*) were processed to PD prawns, glazed to 7-10% and individually quick frozen. 200 g of the samples were vacuum packed in 12 micron PEST/150 G LDPE. Control samples were prepared by packing in air after glazing using 12 micron G PEST/150 G LDPE (control sample 1). Another control sample (control sample 2) was also prepared by packing in air using 12 micron G PEST/150 G LDPE without glaze and vacuum. The samples were stored at $-20\pm 2^{\circ}\text{C}$ for storage studies. After 90 days storage the dehydrated pieces in the first sample constituted 16% and in the second sample, 45%. The dehydrated pieces were nil in the samples packed under vacuum. Tough texture was noticed in the second sample.

Organoleptically, samples packed in first control sample with glaze and air as well as the experimental sample with glaze and vacuum sealed were in acceptable condition even after 90 days storage. The second control sample got rejected due to poor organoleptic characteristics and high percentage of dehydration. Storage studies are being continued.

Mackerel in fish curry medium processed in indigenous retort pouch with F_0 values 8.43 and 6.56 were studied for assessing the quality changes on storage as well as performance of pouch. Fish curry with both the different F_0 values remained in good condition even after 4 months storage with good organoleptic and sensory characteristics.

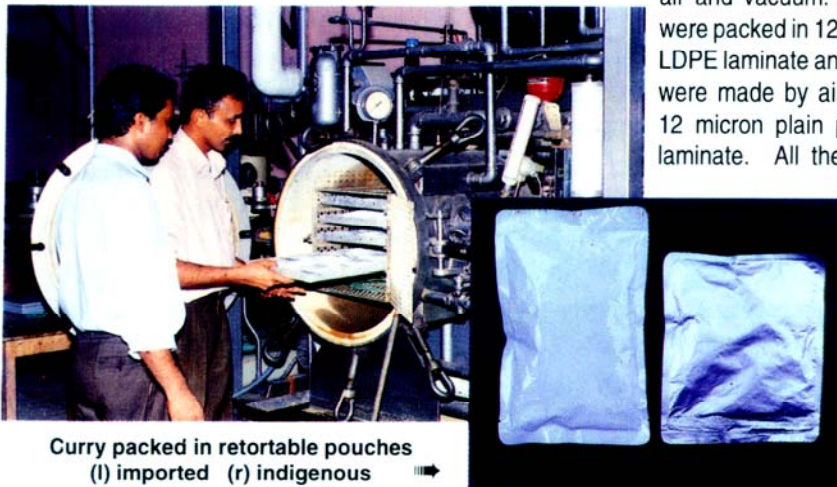
Dried, headless barracuda with a moisture content of 34% and salt content 30% (dry weight basis) were packed in 12 micron PEST/150 G LDPE in air and under vacuum and stored in ambient condition. The samples packed in air developed fungal growth accompanied by change in colour and development of putrid odour after 52 days storage. The sample packed in vacuum had good organoleptic characteristics even after 120 days of storage.

Heat penetration characteristics of fish paste using jew fish mince incorporating starch, fat, sugar, milk etc. were studied. The paste was dispensed in 100-150 g lots in flexible pouches of 12 micron plain polyester laminated with 280 gauge cast polypropylene and heat processed using steam and air pressure. The product reached an F_0 value of 6.83 by maintaining a steam temperature of 112°C and 20 psig over pressure for 60 minutes. The same sample after processing had very good colour, spreadability and organoleptic characteristics.

Fish burgers prepared and packed in imported trays made of HDPE and stored at $-20\pm 2^{\circ}\text{C}$ remained in good condition even after 6 months.

Studies were continued on packing seer fish in air and vacuum. About 200 g of seer fish chunks were packed in 12 micron plain polyester / 150 gauge LDPE laminate and vacuum sealed. Control samples were made by air packing 200 g of the chunks in 12 micron plain polyester / 150 gauge polythene laminate. All the samples were frozen and kept in frozen storage maintained at $-20\pm 2^{\circ}\text{C}$. Not much change was noticed in biochemical characteristics except in TBA values and organoleptic characteristics even after 90 days storage. Clostridium toxin was also not detected in any of the samples during storage.

Retort pouch processing



Curry packed in retortable pouches
(l) imported (r) indigenous







Biochemistry & Nutrition Division

Research Projects handled

- 1. Title of Project : Evaluation of the status of fish in nutrition**
Project Leader : Shri P. D. Antony
Location of Project : Cochin, Visakhapatnam, Veraval
Associates at Cochin : Dr P. G. Viswanathan Nair, Dr M. K. Mukundan, Dr M. R. Raghunath, Shri A. G. Radhakrishnan, Dr Jose Stephen, Smt. Suseela Mathew
- 2. Title of Project : Production and evaluation of biopolymers and biochemicals from aquatic organisms**
Project Leader : Dr M. K. Mukundan
Location of Project : Cochin, (Medical College Hospital, Trichur, Medical College, Calicut)
Associates at Cochin : Dr K. Devadasan, Shri P. D. Antony, Shri T. V. Sankar, Smt. Suseela Mathew
- 3. Title of Project : Biochemical, nutritional and functional properties of fish constituents**
Project Leader : Dr. P. G. Viswanathan Nair
Location of Project : Cochin
Associates : Dr K. Devadasan, Dr M. R. Raghunath, Shri T. V. Sankar, Smt. K. Ammu, Smt. Suseela Mathew
- 4. Title of Project : Autolytic activity in mackerel and squid mantle muscle**
Project Leader : Dr. M. R. Raghunath
Location of Project : Cochin
Associates : Kum. Leema Jose, Kum. P. Maya



CHIEF FINDINGS

-  Content of organochlorine pesticides in fish caught from east coast was well below the hazard levels, in most cases. Hexachlorocyclohexane (BHC) was found to be the predominant pesticide.
-  The content of toxic elements in all the fish samples from the Indian coast was well below the hazard level. Selenium, a micronutrient element, was present at 0.2 to 0.4 parts per million in the samples analysed.
-  Polyunsaturated fatty acids (PUFA) from commercial fish oils were isolated and concentrated. These concentrates were tested in the free form and also as ethyl esters. Docosa hexaenoic acid and Eicosa pentaenoic acid together accounted for 80% of the total PUFA in these concentrates.
-  PUFA concentrate prepared from commercial fish oil lowered serum cholesterol in rats to one third of the original levels at the end of 3 months of feeding.
-  Fatty acid composition of oils of fish from various freshwater farms did not show much variation within the same species.
-  Cholesterol content of thirty two species of fish and shellfish was determined. Most of them had cholesterol levels between 45-70 mg per 100 g tissue.

- ✎ Autolytic activity from mackerel muscle could be extracted by low ionic strength buffers, but an appreciable portion was seen strongly bound to the structural proteins of the muscle.
- ✎ Liver portions from *Mugil cephalus* and *Chanos chanos* had a good level of chitinase activity.
- ✎ Partially purified collagen was prepared from skin and muscle of *Chanos chanos* and characterized for its amino acid composition and electrophoretic behaviour.
- ✎ A composite collagen-chitosan film prepared was found to be fully absorbable without ill effects in rats and is now undergoing evaluation trials on human volunteers as artificial skin in severe burn cases in the Medical College at Calicut, Kerala.
- ✎ Emulsifying activity of water soluble and salt soluble fractions of *Penaeus monodon* proteins decreased during iced storage. The decrease was more pronounced in the case of salt soluble fraction.

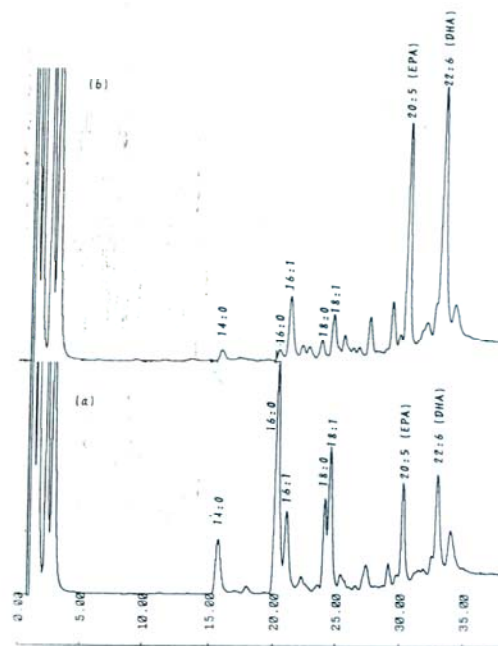
✎ Report of work done

Studies on fish lipids

Polyunsaturated fatty acid concentrate (PUFA-C) was prepared by a simple method from commercial fish oils in both free acid and ethyl ester forms. Docosa hexaenoic acid (DHA) and Eicosa pentaenoic acid (EPA) together accounted for 80% of the total polyunsaturated fatty acids in these preparations. Each form was evaluated for its hypocholesterolemic effect in albino rats.

The free acid form of PUFA-C was found to lower serum cholesterol to about one third of the original levels in rats fed with a hyperlipidemic diet for three months. These studies have thus shown that the new method of preparation of PUFA-C by removing saturated and monounsaturated fatty acids as urea inclusion compounds, does not adversely affect the biological availability of the polyunsaturated fatty acids and their hypocholesterolemic effects. However, lipid and cholesterol levels in the liver of PUFA-C fed rats were significantly higher than the control. The ester form of PUFA-C was not as effective as the free acid form in its serum hypocholesterolemic property. It also led to higher accumulation of total lipids and cholesterol in the liver.

Supplementation of diet with vitamin E (1.5 IU/g of oil) lowered the extent of total lipid and cholesterol accumulation in the liver. Fatty acid composition of liver and heart tissues was significantly altered by feeding PUFA-C diets. The proportions of n-6 fatty acids like C18:2, n-6 and C20:4, n-6 became lower, while those of n-3 fatty acids like C20:5, n-3 and C22:6, n-3 increased.



Fatty acid profiles of (a) commercially available fish oil and (b) PUFA concentrate prepared from the same fish oil.

Note the very low proportion of saturated and monounsaturated acids (16 : 0, 18 : 0, 16 : 1, 18 : 1 etc; 16.8% compared to 60.0% in the original oil) and high proportion of polyunsaturated acids (EPA, DHA etc; 67.7% compared to 21.3% in the original oil) in the PUFA concentrate.

Cholesterol content of 32 species of fish and shellfish was determined. The cholesterol content was below 45 mg per 100g wet tissue in six species. Twenty three of the species studied had cholesterol levels be-

tween 45-70mg%, spade fish (*Ehippus orbis*) 82.7mg% and two shellfish, above 150mg%.

Studies on amino acid profile of fish proteins

Amino acid profiles of proteins of shark, shellfish and fish roe showed that glutamic acid formed the major amino acid in all the samples analysed. Glutamic and aspartic acids were the major amino acids of octopus and shark proteins. Along with glycine, they were the major amino acids in *Penaeus monodon*. Leucine and lysine were the other major amino acids in shark.

Functional properties of fish proteins

Functional properties of sarcoplasmic and myofibrillar fractions of muscle proteins of *Penaeus monodon* were found to be affected differently during iced storage. Relative viscosity of sarcoplasmic proteins was not affected during iced storage, but that of myofibrillar fraction increased after an initial decrease. Emulsion activity index of sarcoplasmic and myofibrillar fractions decreased by 25 and 50% respectively during seven days of iced storage. A thermostable muscle dispersion from *Chanos chanos* was found to be stable even at 100°C at pH 4.3 to 4.5

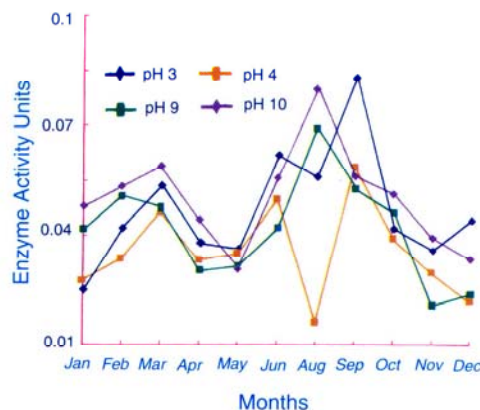
Toxic elements, pesticide residues and micronutrients in fish

Fish samples from the east coast of India were investigated for their organochlorine pesticide residues (OCP). The content of chlorinated pesticides was well below the hazard levels both individually and collectively. BHC formed the major pesticide in these samples as in the case of fish from the west coast and ranged between 0.035 to 0.17 parts per million. The content of toxic elements in the fish samples analysed was also very low. Selenium, a micronutrient, was found in fish at levels of 0.2 to 0.4 parts per million.

Enzymes of technological significance from fish

Liver tissue of *Chanos chanos* and *Mugil cephalus* was found to be a good source of chitinase activity. Mackerel tissue proteinases were active against haemoglobin and casein substrates at pH 3 – 4 & 9 – 10 respectively. The autolytic and proteolytic activities in mackerel tissue were not easily extracted from the structural proteins of muscle, and persisted even after extraction with buffers containing sodium dodecyl sulfate or repeated washing with low ionic strength buffer. Autolytic activity of squid mantle muscle was best expressed in buffers containing sucrose and EDTA.

Seasonal Profile of Autolytic Enzymes in Indian Mackerel Muscle (Adult female)



Biomedical products from marine sources

Partially purified preparations of collagen were obtained from skin, muscle and processing waste of *Chanos chanos*. Two types of collagen, namely, acetic acid soluble (ASC) and pepsin digestible (PDC) collagens could be separated from fish muscle and skin, but from fish waste only ASC could be obtained. The yield of partially purified ASC and PDC were 0.38% & 0.09% respectively from muscle, 20.14% & 5.6% from skin and ASC 0.2% from waste. Characteristics of collagen such as amino acid composition, electrophoretic pattern and molecular weight (by SDS-PAGE) were determined. In comparison, the skin of fish appeared to be a better source of collagen than muscle and waste.

Fish air bladders are reported to be a good source of quality collagen. Collagen-chitosan composite films were prepared using purified collagen from fish air bladder as the starting material. Films thus prepared were whiter and had better appearance than similar films prepared from skin collagen. Physical properties of the film such as tensile strength, air porosity and oxygen transmission rate were studied. Collagen chitosan films were found to be fully absorbable and did not cause abnormal tissue reactions when implanted sub-cutaneously in albino rats. Samples of these films are being tested at the Medical College, Calicut in Kerala on human volunteers as artificial skin in severe burns. Preliminary results are encouraging.






Quality Assurance & Management Division

Research Projects handled

- | | |
|----------------------------|---|
| 1 Title of Project | : Quality assurance and management in seafoods |
| Project Leader | : Shri P. R. Girija Varma |
| Location of Project | : Cochin, Veraval & Visakhapatnam |
| Associates at Cochin | : Dr T. S. G. Iyer, Shri Cyriac Mathen, Dr Francis Thomas, Dr Sanjeev S., Dr P. T. Lakshmanan |
| 2. Title of Project | : Occurrence, effect of processing and survival of halophilic pathogenic vibrios in fishery products of the export trade |
| Project Leader | : Dr. T. S. G. Iyer |
| Location of Project | : Cochin |
| Associates | : Shri P. R. G. Varma, Dr. Sanjeev. S |
| 3. Title of Project | : Selective bio-accumulation of toxicants in cephalopods (viz. squid and cuttlefish) and changes in quality, its upgradation and safety of processed products. |
| Project Leader | : Dr. P. T. Lakshmanan |
| Location of Project | : Cochin |



CHIEF FINDINGS

-  About 200 samples of frozen fish/shell fish products meant for export were found free of *Salmonella*, *Vibrio cholerae*, *Listeria monocytogenes* and Staphylococcal enterotoxins.
-  Process water samples collected from Alleppey district revealed presence of protein nitrogen, phenolic compounds, phosphorus, aluminium and lead necessitating treatment for certification as per EEC norms.
-  Fish roe samples showed higher levels of metal residues than muscle, though within safe limits.
-  Incorporation of 3% sodium chloride in ice increased the shelf life of market fresh fish from 7 to 10 days.
-  The K-value of good quality mackerel was seen to be in the range 45-55%.



Report of work done

Quality evaluation using K-value

Freshness of newly caught specimens of mackerel, sardine, lesser sardine and salmon were evaluated by K-value and other chemical indices. The changes in these indices with ice storage were also followed. The

iced fresh fish remained acceptable for a period of ten days and showed a K-value between 45 and 54%. The quality of different species of fish landed in Cochin fishing harbour was also monitored using K-value. The values were observed to be in the range 19-28% indicating the prime quality of fish landed in Cochin fishing harbour.

Quality evaluation of industrial products

Around 200 samples of fish and fishery products and ingredients for seafood processing drawn from various plants were analysed for quality parameters. All samples were free from *Vibrio cholerae* (01), *Salmonella* and *Listeria*. Some samples showed the presence of *E. coli* and *Staphylococci*, but their population was within safe limits and there were no enterotoxins.

Screening of the products for halophilic *Vibrios* revealed their presence in some samples. The important species identified were *Vibrio cincinnatiensis* (28%), *V. alginolyticus* (26.3%), *V. parahaemolyticus* (16%), *V. vulnificus* (5.3%), *V. furnissii* and *V. mimicus* (4%).



Vibrio cincinnatiensis, the halophilic vibrio species most commonly isolated from frozen fish products.

A consignment of freeze-dried prawn reported to be from India was found to contain an unusual foreign material. The contaminated specimens were subjected to analysis and identification and it was found to be pieces of the coral belonging to sub species *Gorgonium*. It is for the first time that corals have been detected in prawns.

Quality improvement

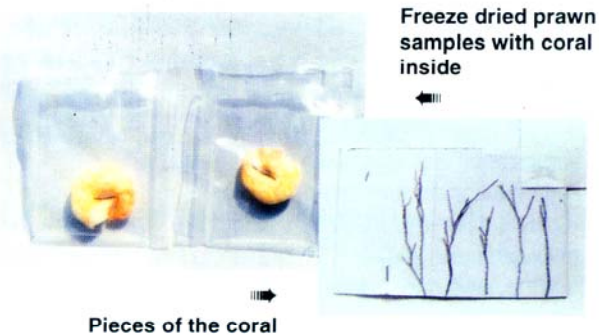
Studies on the role of sodium chloride in ice and shelf life of ice stored fish were continued. The studies revealed that incorporation of 3% sodium chloride in ice can increase the shelf life of fresh fish from 7 to 10 days.

Water quality

A survey on the quality of process water revealed that most of the well and tube well samples had high levels of Kjeldahl nitrogen, phenolic compounds, phosphorous etc. suggesting organic contamination. Isolated samples also recorded marginally higher levels of aluminium and lead. However filtration through activated charcoal bed/ion exchange resin gave satisfactory results.

Assessment team for EU regulations

Scientific expertise was extended to the Export Inspection Council of India to tide over the EEC ban on import of sea foods from India. The Inter Departmental Panel (IDP) and Supervisory Audit Team (SAT) comprising scientists of the Institute, particularly QAM division, assessed several fish processing plants in India based on which twenty three plants have been approved for exporting to EU countries. The process of inspection and approval is still in force. (Details given elsewhere)



Freeze dried prawn samples with coral inside

Pieces of the coral









Engineering Division

Research Projects handled

1 Title of Project	: Design and development of fishing vessels, fish processing equipment and machinery for fishery industry
Project Leader	: Shri S. Ayyappan Pillai
Location of Project	: Cochin
Associates	: Shri P. K. Chakraborty, Shri P. N. Joshi, Shri M. Nasar
2 Title of Project	: Development of indigenous electronic instruments for harvest and post harvest technology of fish
Project Leader	: Dr. T. K. Sivadas
Location of Project	: Cochin
Associates	: Shri K. Ramakrishnan, Smt. K. Vijayabharathy
3 Title of Project	: Development and application of electronics for agricultural investigations
Project Leader	: Dr. T. K. Sivadas
Location of Project	: Cochin
Associates	: Shri K. Ramakrishnan, Smt. K. Vijayabharathy
4 Title of Project	: Design, construction, performance monitoring and popularisation of a new series of deep sea fishing vessels
Project Leader	: Shri M. Nasar
Location of Project	: Cochin
Associates	: Shri S. Ayyappan Pillai, Shri R. S. Manoharadoss



CHIEF FINDINGS

-  A 20% fuel efficiency was obtained with the improved nozzle propeller compared to the open type propellers.
-  Construction of 15.5 m fuel efficient steel fishing vessel of CIFT design is in progress.
-  Basic parameters and general arrangement of an 18 m fuel efficient deep sea trawler and gill netter-cum-long liner were finalised.
-  Development of high speed log with range up to 20 knots was completed.
-  A remote operated multi-channel soil moisture meter was fabricated and supplied to CIAE, Bhopal on payment basis.
-  A prototype experimental model of a through flow cross circulation type mechanical hot air dryer of 12 kg capacity for thelly chemmeen (*Metapenaeus dobsoni*) and jawala shrimp (*Acetes sp.*) was designed.
-  Design of a mechanical system was developed for the production of value-added jumbo prawns by utilising low cost small prawn meat.
-  An inexpensive chamber type PVC solar drier of 10 kg capacity for hygienic dehydration of thelly chemmeen and jawala shrimp was also developed.

Report of work done

Marine Engineering

Performance of the improved fuel efficient nozzle propeller system developed for vessels in the size range 15-18 m was thoroughly monitored. Results have shown that they are 20% more fuel efficient compared to the open type propeller presently used by the fishing industry.

Construction of the 15.5 m fuel efficient steel trawler designed and developed at CIFT is in progress. The vessel, intended for commercial operation and demonstration, is expected to be launched sometime during the coming year.



Construction of the 15.5 m. steel trawler of CIFT design in progress

On the basis of discussions held with the fishing industry and the Ministry of Agriculture to decide on a new design of a deep sea vessel for exploitation of resources in the Indian EEZ, the basic parameters and general arrangement plans for a fuel efficient series of 18 m steel trawler and gill netter-cum-long liner were finalised. Detailed designs are under preparation.

Processing engineering

For the production of value added moulded jumbo prawns from low cost small prawn meat a mechanical system was developed. Design drawings of various accessories of the system were prepared. Fabrication of the mechanical system components is in progress.

With a view to replacing unhygienic sundrying, design of a 10 kg capacity chamber type solar drier using transparent PVC film for dehydration of thelly chemmeen was developed. The unit is made of wooden frame to accommodate two tray shelves and is covered by a transparent film to protect the material from rain. As the unit is very inexpensive it is ideal for an individual fisherman family.

In order to develop a commercial drier, a prototype experimental through flow cross circulation type drier of 12 kg capacity was designed. In this system, electrically heated hot air is passed through and across the fish kept in trays for better drying efficiency.

Instrumentation

Development of high speed log with range up to 20 knots was completed.

One unit of freshness tester was fabricated for assessing the freshness of fresh / frozen fish.

Fabrication of speed log with towed impeller sensor for measurement of towing speed of fishing vessels was completed.

Design and fabrication of sensor for measurement of total water discharge for use in aquaculture feeder canals was also completed.

A remote operated multi-channel soil moisture meter was fabricated and supplied to CIAE, Bhopal on payment as part of ICAR ad-hoc project on Development and Applications of Electronics for Agricultural Investigations.









Extension, Information & Statistics Division

Research Projects handled

1	Title of the Project	:	Estimation of seasonal production in the fish processing industry with special reference to the monsoon trawl ban
	Project Leader	:	Shri G. R. Unnithan
	Location of the Project	:	Cochin
	Associates	:	Dr. A. K. Kesavan Nair, Shri H. Krishna Iyer, Shri V. Annamalai
2	Title of the Project	:	Harvest and post harvest technology transfer and evaluation in fisheries
	Project Leader	:	Dr. S. Balasubramaniam
	Location of the Project	:	Cochin, Veraval
	Associates at Cochin	:	Dr. M. K. Kandoran, Smt. Mary Thomas, Shri V. Annamalai, Shri T. Joseph Mathai, Shri Braj Mohan, Shri Praveen Puthra., Shri M. P. Ramesan



CHIEF FINDINGS

- 
 Demonstrations of nylon monofilament gill nets in Chellanam fishing centre in Cochin revealed that 50 mm gill net yielded higher fish catch than 36 mm gill net.
- 
 The mean extent of adoption of improved technological practices by mechanised fishing boat owners varied from 53.5 to 60 % among three fishing centres. The average annual productivity of fishing boats was found to be higher in Mangrol region than in Veraval and Porbunder regions.
- 
 In two fishing centres, the average fish catch of artisanal fishermen operating FRP crafts was evaluated as 195.95 kg and 47.48 kg per fishing day.
- 
 Among prawn peeling shed owners, training need was perceived more in areas such as post-harvest handling of raw materials, quality of water and ice, cleaning schedules and hygiene and sanitation.
- 
 On group attributes, the respondents from Chellanam Fishermen Welfare Cooperative Society at Cochin were found to have a higher mean group attributes index (71.5%) than the groups from Thaikkal and Kannamaly villages. Annual income did not have any influence on the group attributes perception of respondents in any of the centres.
- 
 Survey on the number and installed capacity of fish processing plants, cold storages, ice making plants and peeling sheds have shown that the capacity to plant ratio is highest in Gujarat, followed by Maharashtra. Kerala registered only the sixth place. The capacity utilisation of fish processing plants in Kerala was estimated to be only 15%.

Report of work done

Nine training programmes were organised during the period and 57 candidates trained in the different fields of fishery technology such as quality control of sea foods, laboratory techniques for identification of bacteria in fish and fishery products, seafood quality assurance, public health and hygiene practices, fishery technology and extension methods, preparation of fish wafers, soup powder and pickles and fabrication of improved gill nets. A group discussion was held among the reservoir fishermen of Pothundy on the scientific setting of gill nets for increasing their fish catches.

In order to popularise the improved gill nets, result demonstrations were conducted at Chellanam, a fishing village near Cochin during November and December 1997. Two types of nylon monofilament gill nets with mesh size of 36 mm and 50 mm (weighing 10 kg each) were fabricated at CIFT for carrying out the demonstrations. The demonstrations revealed that 50 mm nylon monofilament gill net yielded a higher catch of 87.31 kg/h while 36mm nylon monofilament gill net yielded only 7.45 kg/h.



Dr. K. Ravindran, Director, CIFT, handing over fabricated nets to fishermen for field trials

Under the study on 'Adoption of improved practices and productivity in mechanised boats', data were collected from 70 mechanised fishing boat owners in three fishing centres, namely, Veraval, Mangrol and Porbunder. The collected data were tabulated and analysed. The results revealed that on an average fishing boat owners

of Mangrol region operated 13.3 m OAL size boats which were found to be slightly bigger than the boats operated in the Veraval (\bar{X} : 12.43 m) and Porbunder (\bar{X} : 12.60m) regions. The average total investment of a boat owner was Rs.5.91 lakh in Veraval, Rs.6.72 lakh in Porbunder and Rs.7.81 lakh in Mangrol. The overall extent of awareness about technological practices was estimated as 61.9%. The mean extent of adoption of improved technological practices varied from 53.5 to 60% among the three centres. The average annual productivity of fishing boats was found to be higher in Mangrol region (100.33 tonnes) than in Veraval (78.6 tonnes) and Porbunder (70.0 tonnes) regions.

Data collected on 'Innovation proneness, productivity and associated factors among fishermen', from 22 fishermen operating FRP crafts in Veraval and 19 fishermen in Jaleshwar were tabulated and analysed. The studies revealed that on an average, the fishermen respondents of Veraval had 241 days of fishing, 22 years of experience, operated 9.84 m. OAL size FRP crafts, invested Rs.1,07,611 on craft, engine and nets and their mean innovation proneness index was estimated as 56.36%. The respondents of Jaleshwar were found to have 23 years of experience, 156 days of fishing in a year, 8.77 m.OAL size FRP crafts, and had invested Rs.1,57,119/-. The mean innovation proneness index was estimated as 60%. The average fish catch per fishing day was calculated as 195.95 kg for the respondents of Veraval Centre and 47.48 kg for the fishermen respondents of Jaleshwar centre. Further analysis of data is in progress.

Research on 'Marketing channels and margins in fresh fish trade' was started and data collection on different marketing channels initiated. As the season was dominated by prawn landings and the prawns were not channeled into domestic market in any significant way from Cochin landing centres, the data collection was focussed on arrivals from outstation landing centres into Champakara market, Cochin. Seventy to eighty percent price variation was observed in respect of sardine and mackerel between wholesale and retail. Other varieties of fish did not come in for transaction in any significant quantities.

In the study on 'Training needs and technological adoption in prawn peeling units', data were collected from the peeling units in Chandiroor area. On an average, the number of days of peeling work in a year was found to be 158. PD and PUD were the two major types of products peeled in these peeling units. The total investment of respondents ranged from Rs.40,000/- to Rs.3,00,000/-. The approximate quantity of raw materials peeled varied from 120 to 240 tonnes per year. Training need was felt in areas such as post-harvest handling of raw materials, water and ice to be used in pre-processing, cleaning schedules to be followed and hygiene and sanitation aspects. Further data collection is in progress.

On 'Group dynamics among fishermen and their technological adoption', data were collected from a total of 82 respondents from three selected fishermen village cooperative societies. The average annual income of these respondents in the three villages viz., Thaikkal, Kannamaly and Chellanam was found to be Rs.67,136, Rs.21,571 and Rs.28,377 respectively. On group attributes, ie., structure, objectives, performance interaction and values, the respondents from Chellanam were found to have higher mean group attributes index (71.5%) than the groups from the other two centres.

Data on the number and installed capacity of fish processing plants, cold storages, ice making plants

and peeling sheds were collected from the maritime states of the country and analysed. The study showed that the capacity to plant ratio was highest in Gujarat (39.70 tonnes) followed by Maharashtra (32.37 tonnes). Kerala state with the highest number of processing plants (31.1%) registered only the sixth place with 12.86 tonnes. Thus it is observed that the fish processing industry is mostly comprised of small and medium capacity plants in Kerala.

For estimating the seasonal production in the industry, a suitable proforma was prepared and the month-wise, item-wise production and other relevant details collected and compiled initially from 17 processing plants. The data were analysed for evolving a suitable sampling plan for the survey.

Processing plants were stratified based on their installed capacities into 4 strata - those below 5 tonnes, 5-10 tonnes, 10-15 tonnes, and above 15 tonnes. The results showed that the highest number of 48 factories belonged to the first stratum, followed by 37 factories to the second, 16 factories to the third and 22 factories to the fourth stratum. For coverage of more factories for the study, data from 28 more factories were collected during the period for detailed analysis. The analysis show that in Kerala the utilised capacity of fish processing plants is only 15% based on 365 working days with three shifts per day.



Microbiology, Fermentation & Biotechnology Section

Research Projects handled

- | | |
|---------------------------|--|
| 1 Title of Project | : Investigation of aquatic micro-organisms with reference to pollution, fish preservation, pathogenesis and bioactivity |
| Project Leader | : Dr P. K. Surendran |
| Location of Project | : Cochin |
| Associates | : Dr Nirmala Thampuran, Shri V. Narayanan Nambiar, Dr Sanjeev, S., Smt. K. V. Lalitha |
| 2 Title of Project | : Improved utilisation of low value fish (STD-3 - Network project) |
| Project Coordinator | : Dr K. Gopakumar |
| Project Supervisor | : Dr P. K. Surendran, Dr. K. Devadasan, Dr Jose Joseph |
| Location of Project | : Cochin |
| Associates | : Kum. P. S. Reena, Smt. P. Seema Nair |
| 3 Title of Project | : Occurrence of <i>Vibrio vulnificus</i> in tropical marine fish and development of methods for their eradication |
| Project Leader | : Dr. P. K. Surendran |
| Location of Project | : Cochin |
| Associates | : Dr Nirmala Thampuran, Kum. K. Sudha, Shri V. Vinod. |



CHIEF FINDINGS



Clostridium botulinum was found in two out of ten samples of farmed shrimp collected from Chellanam area of Ernakulam district. The cultures were identified as *C. botulinum* type C and D.



Bacteriocins produced by four out of twelve lactic acid bacterial cultures were found to be active against *Listeria* sp. including *Listeria monocytogenes*.



Optimum growth temperature of five marine species of pathogenic *Vibrios*, namely, *V. parahaemolyticus*, *V. alginolyticus*, *V. mimicus*, *V. vulnificus* and *V. harveyi* was found to be 37°C



Report of work done

Clostridium botulinum in farmed shrimp

Farmed shrimp (*Penaeus monodon*), water and mud samples collected from 3 ponds in an extensive farm in Chellanam area were screened for the presence of *C. botulinum*. Of the 6 mud samples examined, one sample was found to be contaminated with *C. botulinum* type D. Out of the ten samples of farmed shrimps, two (20%) were found to harbour *C. botulinum*. These cultures were identified as *C. botulinum* types C and D.

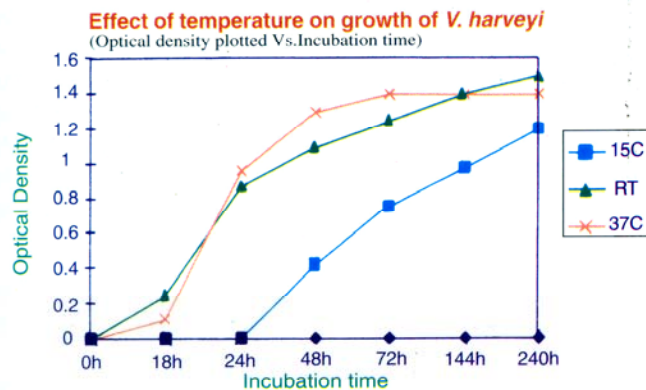
Listeria sp. in fish and fishery products and their control

Studies on the effect of lactic acid bacteria (LAB) and bacteriocins produced by LAB cultures on the growth of *Listeria* spp. were continued. LAB cultures were isolated from fish and fishery products from local markets. The lactic acid cultures isolated were found to belong to *Lactobacillus plantarum*, *L. casei*, *L. acidophilus* and *L. fermentum*. Out of the 26 cultures of LAB tested against *Listeria* cultures isolated from fish and fishery products, 12 were found to inhibit the growth of *Listeria* spp., including one strain of *L. monocytogenes*.

Bacteriocins were isolated from all these 12 LAB cultures tested against *Listeria* spp. by the agar diffusion method. Bacteriocins from four of the LAB cultures were found to be active against *Listeria* spp. including one *L. monocytogenes* strain.

***Yersinia enterocolitica* in fish and shell fish**

Fifteen samples of fish and shell fish collected from various markets in Cochin were tested for the presence of *Yersinia enterocolitica*, which is recognised as a causative agent for diarrhoeal diseases in humans. The samples were directly plated on *Yersinia* selective agar and also by enrichment technique using phosphate-buffered saline. Twenty suspected cultures were isolated from the samples and were subjected to detailed biochemical tests. Typical *Yersinia enterocolitica* strains could not be isolated.



(*Vibrio harveyi* is a marine luminiscent bacteria found on the body surface and intestinal contents of marine animals. It is useful as an indicator of abnormalities in Penaeid shrimp grow-out phase and can cause mortality in prawn hatcheries.)

Studies on marine pathogenic *Vibrios*

The growth pattern of five marine pathogenic *Vibrios*, *V. parahaemolyticus*, *V. vulnificus*, *V. alginolyticus*, *V. mimicus* and *V. harveyi* was studied at different incubation temperatures, namely, 4°C, 15°C, room temperature (RT, 28 ± 2°C), 37°C & 42°C in Trypticase Soy Broth with 3% NaCl. All the tested species were isolated from fish samples collected from the Arabian sea off Cochin and maintained in the type culture collection of the laboratory. Optimal temperature for growth of all the species was found to be 37°C. *V. parahaemolyticus* and *V. alginolyticus* exhibited growth even at 42°C. These *Vibrio* species grew slowly at 15°C, but failed to grow at 4°C thereby indicating their sensitivity to low temperature.

Twenty important biochemical reactions were also studied at the above temperatures. Observations of the biochemical activity at different temperatures were in accordance with the growth study results except at 15°C, where, although there was growth, most of the biochemical reactions gave negative results.

Microbial enzymes

Two hundred and two bacterial cultures in all were isolated from fish and fishery environments and screened for the elaboration of enzymes like amylase, nitrase, tryptophanase, lipase and pectinase. Of these cultures 42% produced amylase, 14% produced lipase, 28% elaborated nitrase and 10% produced tryptophanase.

Amylase activity of the cultures was evaluated by the agar diffusion method as well as spectrophotometrically. It has been found that there is a linear relationship between the zone of amylase activity and the log concentration of the enzyme. Further studies to standardise the same are underway.

Halophilic bacteria in dried and cured fishery products

Sixty eight dried and cured fish samples from fish markets around Cochin were examined for halophilic bacteria. Of the 84 cultures isolated, 24 were found to be obligately halophilic, requiring at least 20% sodium chloride in the culture media for growth. They were red halophiles belonging to *Halobacterium* spp. and *Halococcus* spp.

Bioactive substances from marine microorganisms

Sea water, bottom mud and intestinal contents of marine fishes were screened for *Actinomyces*, capable of producing antibacterial substances. Ten cultures of *Actinomyces* were isolated and tested against pathogenic bacterial cultures for antibiotic activity. All six *Actinomyces* cultures showed good inhibitory activity against the 8 gram positive bacterial strains tested. None of the *Actinomyces* cultures exhibited any antibiotic property against the *Salmonella* cultures tested.

Staphylococcus enterotoxins and *Shigella* in fish and fishery products

Twenty six samples of frozen fish and fish products were examined for the incidence of the enteric pathogen *Shigella*. It was found that all the samples were free

from the pathogen. Enterotoxigenicity of coagulase positive *Staphylococci* isolated from fish and water were also examined by the Reversed Passive Latex Agglutination (RPLA) technique. Only a few strains produced enterotoxins A and B.

Bacteriological quality of fish in retail trade in Cochin

Samples of fresh fish collected from six different retail markets situated in and around Cochin were analysed for their bacteriological quality, with special reference to total viable bacterial count, total coliforms and *E. coli* and the incidence of *Salmonella* and *Bacillus cereus*. Of the 155 samples studied, 106 samples (68%) had a total bacterial count exceeding one million per gram (10⁶ /g) and 57 samples (37%) of fish had *E. coli* count exceeding 100/g (MPN). Thirty samples (19%) carried *Bacillus cereus* and 32 samples (20%) indicated the presence of *Salmonella* serotypes. Significant difference was not noticed in the bacterial quality of the fishes from these six retail markets.

Toxigenic *Bacillus cereus* in fish and fishery products of retail trade

Studies were continued on the incidence and distribution of toxigenic *Bacillus cereus* in fish and fishery products from the retail fish markets of Cochin. A total of 110 samples of fresh fish comprising of 20 different species were examined. Twentyfour per cent of the fresh fish samples were found to carry *Bacillus cereus*. Out of the 27 cultures isolated and tested for the production of diarrhoeal enterotoxins by the RPLA technique, 23 cultures (85%) were found to be capable of producing the diarrhoeal enterotoxins.

Salmonella serotypes in fish/fishery products of internal trade

One hundred and ten samples of fresh fish comprising of 20 different species from local markets of Ernakulam district were again examined for *Salmonella* serotypes by the Salmonella Rapid Test method, the ELISA technique and the Standard cultural method of the USFDA. *Salmonella* serotypes were detected in 24 samples (22%) by the ELISA technique, in 18 samples (20%) by the SRT method and in 16 samples (17.6%) by the standard USFDA cultural method.

This observation proves the superiority of the ELISA technique for the detection of *Salmonella* in fishery products over the other methods employed.

STD-3 Project: Lactic acid bacteria in fish preservation

Salt tolerance of 42 selected lactic acid bacterial (LAB) cultures representing all the isolated species of lactic acid bacteria, were determined in the range of 0 to 10% (w/v) of NaCl in MRS broth. Growth was followed spectrophotometrically. It was found that LAB cultures belonging to all the species tested grew well in presence of NaCl upto 5%. None of the cultures showed visible growth beyond 8% salt conc. Among the LAB groups, *Lactobacillus cellobiosus* showed maximum salt tolerance (8%) while *L. casei* and *L. brevis* showed the least salt tolerance (5.5%).

Sugar fermentation of LAB cultures was studied using 18 sugars. All the cultures tested fermented glucose, 80% of the cultures fermented lactose, sucrose, maltose, sorbitol and starch, 40% fermented xylose, fructose, ribose and salicin, 32% fermented melizitose, inulin and cellobiose, 20% mannitol and arabinose and 16% inulin. Production of titrable acidity and the lowering of pH in MRS broth as function of glucose concentration by the LAB cultures were also studied. Out of the 19 cultures tested, 10 could attain a titrable acidity of 10 ml. 0.01N. NaOH/ml of culture in MRS broth with glucose. The lowest pH was attained by *L. plantarum* cultures in 48 hr. at a glucose conc. of 2% in MRS broth.

ICAR Cess Fund Project – Occurrence of *Vibrio vulnificus* in tropical marine fish and development of methods for their eradication

The total halophilic count of sea water was seen to be in the range 10⁴ to 10⁵ / ml. The total *Vibrio* count was much less than the total halophilic count. Important *Vibrio* species encountered in sea water were, in the order of dominance, *V. parahaemolyticus*, *V. campbelli*, *V. orientalis* and *V. mediterranei*. *V. vulnificus* was not detected in any of the water samples. In the very fresh fish taken from the fishing vessel, TPC (halophilic) and TPC of the skin with muscle was the lowest, followed by gills and intestine. The same trend was noticed for fish from the landing centres also. The TPC of the fish collected from the vessel was about one log lower than that of freshly landed fish. However, the counts of the gills and intestine of two sample lots were almost comparable. Species-wise distribution of *Vibrios* in fish collected from the vessel and freshly landed fish were similar. Dominant species observed were *V. alginolyticus*, *V. parahaemolyticus*, *V. campbelli*, *V. orientalis*, *V. mimicus*, *V. splendidus* and *V. vulnificus*. About 17% of the market samples harboured *V. vulnificus*.








VERAVAL RESEARCH CENTRE

Research Projects handled

- 1 Title of Project : Fishing techniques of migratory fishes.**
 Project Leader : Shri P. George Mathai
 Location of Project : Cochin & Veraval
 Associates at Centre : Shri Pravin Puthra, Shri M.P. Ramesan
- 2 Title of Project : Investigations on demersal trawls for continental shelf and slope**
 Project Leader : Shri K. K. Kunjipalu
 Location of Project : Cochin, Visakhapatnam & Veraval
 Associates at Centre : Shri Pravin Puthra, Shri M.P. Ramesan
- 3 Title of Project : Development of resource specific trawl gear system and assessment of commercial trawling practices**
 Project Leader : Shri V. Vijayan
 Location of Project : Cochin, Veraval & Visakhapatnam
 Associate at Centre : Shri Pravin Puthra
- 4. Title of Project : Harvest and post harvest technology transfer and evaluation in fisheries.**
 Project Leader : Dr. S. Balasubramaniam
 Location of Project : Cochin & Veraval
 Associates at Centre : Shri Pravin Puthra, Shri M.P. Ramesan
- 5. Title of Project : Studies on handling practices and their impact on quality of fish and fish products.**
 Project Leader : Shri K. K. Solanki
 Location of Project : Veraval
 Associates : Shri R. Badonia, Dr C. N. Ravishankar, Dr K. Asok Kumar, Dr Arnab Sen, Shri A. A. Zyanuddin
- 6. Title of Project : Evaluation of the status of fish in nutrition**
 Project Leader : Shri P. D. Antony
 Location of Project : Cochin, Veraval & Visakhapatnam
 Associate at Centre : Dr. K. Asok Kumar
- 7. Title of Project : Quality Assurance and management in seafoods**
 Project Leader : Shri P. R. Girija Varma
 Location of Project : Cochin, Veraval & Visakhapatnam
 Associate at Centre : Dr K. Asok Kumar



CHIEF FINDINGS

-  Studies on the present status of indigenous fishing gear of Gujarat coast have shown gill nets, dol nets and stake nets to be the predominant indigenous gear used in the area.
-  A 20 m two seam large mesh sputnik trawl was introduced for popularisation at Veraval.
-  Almost all wooden canoes in Veraval have been replaced by FRP canoes.
-  HACCP plan for production of frozen ribbon fish as whole, steak and fillets was standardised.
-  Aryl sulphatase producers predominated the microbial flora of dhoma, while *Proteus* sp. and *Pseudomonas* sp. predominated that of squid and cuttlefish.
-  Technology for upgradation of jawala, *Acetes* sp. for human consumption was standardised.
-  Source of contamination of *Vibrio* sp. in freshly landed fish at Veraval was identified.

Report of work done

Fishing gear

Collection of information on the present status of indigenous fishing gears in Gujarat coast was completed. While gill nets, dol nets and stake nets were the predominant gears used, lines and cast nets were also seen to be used on a small scale. A 20 m two seam large mesh sputnik trawl was given to a private trawler for popularisation of the CIFT design at Veraval.

Data collection on various components of research projects was carried out at Veraval, Mangrol, Porbunder and Jaleshwar fishing centres.

Local fishermen of Jaleshwar fishing centre were given CIFT designed polypropylene nets for commercial operation.

Survey was continued under the FAO sponsored programme on 'Co-operative research network in Asia and Indian Ocean region on selective shrimp trawling' and data got ready for analysis.

Fish processing

Samples of fresh / frozen dhoma and ribbon fish were analysed to assess the microbiological quality and an attempt made to correlate the microbial flora with the spoilage characteristics in both the species.

Aryl sulphatase producers were seen to predominate in dhoma when compared to ribbon fish.

Attempts were made to standardise the use of Phenolphthalein Phosphate Agar for characterising coagulase positive staphylococci. Studies are in progress.

Studies were carried out to ascertain the public health and hygiene aspects of freshly landed fish and shellfish at various landing centres of Veraval. On the basis of periodic sampling it was observed that the creek water which discharges city sewage waste to the harbour area is mainly responsible for contaminating the harbour water. Since this water is used for washing the landed fish, occurrence of pathogenic bacteria like *Vibrio* sp. and *Salmonella* sp. has become very common.

Studies were carried out on the microbial profile of squid and cuttlefish. *Proteus* sp. and *Pseudomonas* sp. predominated the microbial flora.

Studies were also carried out on upgradation and utilisation of jawala (*Acetes* sp). Methods were standardised for preparation of several products for human consumption like wafers, cutlet, soup powder, spirals and squid stuffed with jawala. Taste panel studies have shown good acceptance for all the products.

VISAKHAPATNAM RESEARCH CENTRE

Research Projects handled

1 Title of Project	:	Management measures in trawling with reference to conservation and fuel saving
Project Leader	:	Shri N. Subramonia Pillai
Location of Project	:	Cochin & Visakhapatnam
Associates at Centre	:	Shri S. V. S. Rama Rao, Dr.G. Rajeswari
2 Title of Project	:	Investigations on demersal trawls for continental shelf and slope
Project Leader	:	Shri K. K. Kunjipalu
Location of Project	:	Cochin, Visakhapatnam & Veraval
Associates at Centre	:	Shri G. Narayanappa, Shri S. V. S. Rama Rao, Dr. U. Sreedhar
3 Title of Project	:	Development of resource specific trawl gear system and assessment of commercial trawling practices
Project Leader	:	Shri V. Vijayan
Location of Project	:	Cochin, Veraval & Visakhapatnam
Associates at Centre	:	Shri G. Narayanappa, Shri S. V. S. Rama Rao
4 Title of Project	:	Studies on processing and quality aspects of fish and fishery products in the east coast of India
Project Leader	:	Shri Sib Sankar Gupta
Location of Project	:	Visakhapatnam
Associates	:	Dr. D. Imam Khasim Saheb, Dr. R. Chakraborti
5 Title of Project	:	Evaluation of the status of fish in nutrition
Project Leader	:	Shri P. D. Antony
Location of Project	:	Cochin, Visakhapatnam
Associate at Centre	:	Dr. D. Imam Khasim Saheb



CHIEF FINDINGS



Salted and dried fish samples collected from Visakhapatnam coast were analysed to screen fungal infection. The fungi isolated were identified as *Aspergillus flavus*, *A. niger*, *Penicillium* sp. and *Mucor* sp.



Shrimp feed samples marketed in Andhra Pradesh during the year were observed to contain very little sand compared to the previous years, indicating improvement in quality.

Report of work done

Fishing gear

Field trials were carried out with the newly developed 26.5 m light weight trawl. The net was operated continuously for 78 hours at depths between 20 to 50 m. The catch rate on an average was 12.6 kg. Ribbon fish constituted 25 % followed by 20.6% silver bellies. Significant percentage of sciaenids (14.7%) and sardines (13.25 %) were also landed. Prawns formed 3.7 % of the total catch.

The newly evolved 30 m fish trawl was also subjected to excessive field trials at different depths off Visakhapatnam. During 131 hours of operation the gear landed 2.2 tonnes of fish, indicating a catch rate of 16.8 kg / h. Silver bellies constituted 30% followed by ribbon fish (23.4%), sciaenids (11.61%), crab (10.38%) and prawn (4.13 %).

Investigations were continued with the 25 m rope trawl. The gear was operated for 81 hours. The net landed on an average 14.9 kg fish per hour, silver bellies constituting 36% of the catch, *Nemipterus* sp. 23.3%, sciaenids 14% and sardines 7%.

Fish processing

One hundred and ten fish and shellfish samples were collected from Visakhapatnam fishing harbour, deep sea fish samples from a FSI fishing vessel, fresh fish and shellfish from Kakinada and Kolleru and cultured prawns from Nellore, their different tissues separated and digested for heavy metal analysis. The edible muscle of twenty four fish samples caught from in and around the fishing harbour area exposed to hydrocarbon pollution was extracted for PAH compound analysis. Twelve numbers of cultured prawn and fish samples were also tested for organochloro pesticide residues.

About forty five different varieties of fish and shellfish including some deep sea fish samples collected from different areas in Andhra Pradesh were analysed for proximate composition and nutritional elements like Ca, P, Fe, Na and K. These included some new varieties not hitherto analysed, such as *Cepola abbreviata*, *Lethrinus nebalosus*, *Myripristis botche*, *Glyphidodon leucogaster*, *Dactylopterus orientalis* and *Caranx djeddaba*.

Twenty one samples of fish and shrimp feed were analysed for chemical composition, nutritional and toxic elements. Shrimp feed samples produced and marketed during the year were seen to contain low content of sand compared to the samples marketed the previous years, indicating an awareness for improvement in quality. Some of the feed samples tested for aflatoxin gave negative result.

Convenient ready-to-cook dried fish samples were prepared from small sized anchovies and ribbon fish and subjected to treatment with STPP for improving textural quality. Mites were found infesting the stored cured and dried control ribbon fish samples after six months storage. Red halophilic bacteria attack occurred first at the tail region after five months storage. Moisture content varied from 27.5 % to 32 % and salt content from 10.5 % to 13.65 %. A second batch of dried ribbon fish was prepared using STPP treatment to control the red halophilic bacteria and mite attack. Studies are continued.

Common jelly fish tentacles, puffer fish tissues and cuttlefish ink were extracted for analysis and screening for medicinal substances.

Salted and dried samples of mackerel, jew fish, lizard fish, Indian salmon, Indian herring, pomfret, mullet and *Mene maculatus* were collected from Visakhapatnam coast and screened for fungal infection. The fungi isolated were identified as *Aspergillus flavus*, *A. niger*, *Penicillium* sp. and *Mucor* sp. Majority of the fungi isolates could not grow in potato dextrose agar media containing 10 % NaCl.

Survey on the presence of histamine in fresh fish of Visakhapatnam coast has shown that in fishes like seer, mullet and *Mene maculatus*, the level of histamine was between 2-4 mg per 100 g muscle, while in fresh sardine and rainbow sardine it was below 1 mg per 100 g muscle.

Twenty eight fish samples were analysed for pathogenic bacteria such as *Salmonella* and *Vibrio cholerae*. No incidence of bacteria was seen in any of the samples.

BURLA RESEARCH CENTRE

Research Projects handled

1 Title of Project	:	Studies on improved harvesting techniques
Project Leader	:	Shri A. A. Khan
Location of Project	:	Burla
Associates	:	Nil
2 Title of Project	:	Improvements on the existing methods of processing fish in Orissa
Project Leader	:	SHRI J. K. Bandyopadhyay
Location of Project	:	Burla
Associate	:	Shri A. K. Chattopadhyay



CHIEF FINDINGS

Live small sized freshwater fishes such as *R. chrysea* and *Tilapia mosambica* can be pseudo hibernated between 60°C and 80°C applying cold shock.



Report of work done

(As the Centre is in the process of shifting to Hoshangabad, the research work remained suspended for some period)

Studies were carried out on the time-temperature tolerance for cold shock hibernation of small varieties of freshwater fishes *R. chrysea* and *Tilapia mosambica*.

Effect of size group on the time taken for hibernation was studied. It was observed that smaller

fishes hibernated quicker but regained consciousness slowly when compared to the larger fishes. The smaller fishes could be pseudo-hibernated between 6°C and 8°C.

Storage studies were also initiated by keeping the inactivated fishes in moist condition at about 12°C–16°C in PUF (poly urethane foam) insulated boxes without dipping in water.



CALICUT RESEARCH CENTRE

Research Projects handled

1. Title of Project	:	Processing of marine and freshwater fishery resources into upgraded traditional products
Project Leader	:	Shri K. George Joseph
Location of Project	:	Calicut
Associates	:	Shri T. S. Unnikrishnan Nair (upto 30.6.97), Kum. Bindu, J
2. Title of Project	:	Studies on the ecology and behaviour of blow fly populations in fish processing and storage systems with respect to the development of a target system for pest control
Project Leader	:	Dr Julia Howard
Location of Project	:	Calicut
Associates	:	Kum.. Bindu, J



CHIEF FINDINGS



Ready-to-fry dried fillets were prepared from fresh ribbon fish, sole and anchovies.



Unlike in other dried fish, in masmin, *Rhizopus* sp. of fungi was in abundance.



Aspergillus sp. continued to be the major constituent of microflora in dried fish brought to Calicut from outside Kerala.



Report of work done

Trials on commercial scale applicability of anti-red and anti-insect treatments.

Experiments conducted during the previous year at a commercial godown owned by M/s K.M.Traders, Vaniyamkulam, near Shornur had clearly shown that spraying the outer surface of the containers of dry fish with three insect repellent materials, namely, gingly oil, hydnocarpus oil and Pyrocon-E (a preparation from Pyrethrum) had pronounced effect in controlling insect attack. Of the three types of containers used viz., gunny bags, coconut leaf baskets and palmyrah leaf baskets, the efficiency of coconut leaf baskets was found to be lower than the other two considering all aspects of commercial storage. Therefore, another trial on a similar line was started using only gunny bags and palmyrah leaf baskets as containers. Reprocessed commercial samples of dried silver belly were used for the experiments. Control as well as calcium propionate treated

samples were packed both in treated and untreated containers. The samples stored in a commercial godown were found free of insects even after two months storage.

Studies on fungi in dried fish

Seventy eight samples of dried fish brought to Calicut central fish market from curing centres outside Kerala were collected and subjected to mycological analysis. A total of 189 fungal cultures comprising *Aspergillus* sp. (60.3%), *Aspergillus niger* (14.8%), *Polypaecilum* sp. (6.4%), *Rhizopus / Mucor* (18.0%) and *Penicillium* (0.5%) were isolated from the samples.

Water activity (a_w) of the samples showed a range of 0.75 - 0.78.

Studies on red halophiles

Ten samples of dried fish of various species were brought to Calicut central market from curing centres within the state as well as from outside and tested for their microbiological quality with regard to halophilic bacteria.

	Range of bacterial load
Total halophiles	$01.753 \times 10^3 - 3.65 \times 10^5/g$
'Red' halophiles	$0.548 \times 10^3 - 1.38 \times 10^5/g$
Standard plate count	$0.329 \times 10^3 - 2.96 \times 10^5/g$

Improvement in quality of masmin

Quality of traditional masmin was assessed with emphasis on determining the microflora of the product. Masmin produced in Lakshadweep islands employing traditional methods are brought to Calicut central market occasionally. Samples were collected on three occasions and subjected to mycological as well as chemical analysis, results of which are given below.

Moisture	-	14.15	-	18.2%
Chloride	-	01.75	-	06.73%
Fat	-	02.8	-	03.4 %
Protein (DWB)	-	75.25	-	87.5%

Thirty nine fungal cultures were isolated from these samples. Of these, 64.1% belonged to different strains of *Aspergillus* sp. and the rest (35.9%) to *Rhizopus* sp. It was observed that compared to the usual dried fish samples, percentage of *Rhizopus* sp. in masmin is almost double. Water activity (a_w) of the samples showed a range of 0.70 - 0.75.

Determination of preservative residues in fish and fishery products

Aqueous extracts of preservative treated fish and fishery products were prepared for estimation of lower fatty acids with a view to determining the residual calcium propionate in the respective samples. Ten such extracts are currently being analysed.

Preparation of ready-to-fry dried products

Shelf stable and very attractive dried products could be prepared from sole and anchovies. These when

seasoned with a chilli extract like Spice Drop, salt and preservative treated remained in good condition for more than two months. The samples could be fried as such without soaking in water.

Preliminary trials were also carried out for preparation of ready-to-fry dried ribbon fish fillets using the chilli extract as seasoning agent and calcium propionate as preservative. The product, under laboratory conditions, has been remaining in good condition for more than two months.

Survey of major markets / retailers/ consumers

The survey is aimed at determining the present status of the dry fish trade as a whole, the demand-supply balance as well as choice of the consumer for specific products.

As a first stage of the survey, major markets in Thalassery, Calicut, Malappuram, Palghat and Manjeri were visited and details of wholesale trade collected through exhaustive interviews with three wholesalers in Thalassery, three in Calicut, three in Malappuram, six in Palghat and two in Manjeri. Two sub-dealers in Kuttiadi, one in Kallachi, one in Thottilpalam and three in Perambra were also interviewed and data collected.

The major observations from the interviews so far carried out was that there is always demand for good quality dried products.

Studies on blow-flies in processed fish

Studies were initiated under the ODA funded CIFT-University of Bristol collaborative project "Studies on the ecology and behaviour of blow-fly populations in fish processing and storage systems with respect to the development of a target system for pest control".



MUMBAI RESEARCH CENTRE

Research Projects handled

Title of Project	:	Quality improvement and value addition in fish and fishery products of Maharashtra coast for domestic and export market
Project Leader	:	Shri D. K. Garg
Location of Project	:	Bombay
Associate	:	Shri S.P. Damle



CHIEF FINDINGS



In Pune fish markets marine as well as freshwater fishes are transported by road in bamboo baskets in iced condition from Bombay, Ratnagiri and Goa.



The quality of fish chunks from fishes like ghol and rawas sold in Navi Mumbai markets was found superior to other varieties.



Report of work done

Studies were continued on the quality evaluation of fish retailed in fish markets of Navi Mumbai and Pune. In the retail markets of Navi Mumbai, medium sized fish like perches are sold in pairs, while very small ones like anchovies, threadfin bream and mullets are sold in heaps called "wata", each weighing 400-500 g. Larger fishes like rawas (Polynemids) and ghol (croakers) are sold in chunks, each chunk weighing approximately $\frac{1}{2}$ kg. The total bacterial count (TBC) of small sized fish ranged between 10^5 - 10^6 indicative of poor handling and lack of proper preservation, like icing. In the case of large sized fishes, the TBC was in the range 10^4 - 10^5 indicating that these fishes are probably washed and iced before being sold as chunks. The TVN value of these chunks varied between 14.2-16.4 mg% while in small varieties of fish, the value ranged between 25.8 and 28.3 mg%. Pathogens were however not detected in any of the samples.

Studies were also carried out on the keeping quality of the fish kept in ice storage in the laboratory. Small sized fish like mullet and large sized fish like Polynemids were taken for the ice storage studies. Both the species were separately stored in crushed ice in 1:1 ratio. The mullets exhibited a shelf life of 5 days

in ice with TPC registering a decline from 10^5 to 10^3 on the third day and then rising to 10^5 on the fifth day. The TVN value also declined from 26.4 mg% to 18.3 mg%. After five days the material became unacceptable. Chunks of Polynemid exhibited a shelf life of 6 days, beyond which the acceptability was poor.

Similar studies were also carried out of two fish markets in Pune, namely, Shivaji Market and Ganesh Peth Market. Wholesale and retail trade of both marine and freshwater fishes is carried out in these fish markets. Marine fishes like pomfret, seer, ghol, dhoma and sole are brought from Mumbai while sardines and mackerel are transported from Ratnagiri and Goa. The material is packed in bamboo baskets with ice and then transported by road to Pune where it reaches in prime condition. Unlike in Mumbai markets, in Pune, all varieties are sold by weight irrespective of size. The freshwater fishes sold in Pune markets comprise mainly of rohu, catla and catfish which are brought from adjoining water tanks and lakes.

Hygienic condition in the peeling sheds in Sassoon dock was observed to be poor. Peeling was carried out mainly on the floor with slush coming in direct contact with the peeled matter, thus contaminating the material.

Fishing Cruise

The following fishing cruises were undertaken on board FORV *Sagar Sampada* during the period under report.

Cruise No.	Period	Participants	Objectives
155	7-9 May 1997	Shri K.K. Kunjipalu Shri Francis Xavier	For filming the various research activities of FORV <i>Sagar Sampada</i>
156	19-25 May 1997	Shri K. Ramakrishnan Shri C.R. Gokulan	Operation and testing of electronic instruments used for fish detection, evaluation of performance of gear and oceanographic measurements

Technologies assessed and transferred

- ➔ Designs of twelve wooden fishing vessels in the size range 7.62 m- 15.24m
- ➔ Designs of aluminium crafts for inshore waters and FRP pole and line fishing vessels for Lakshadweep waters
- ➔ Effective treatment for low valued species of timbers for boat construction and formulation of indigenous preservatives for traditional fishing craft
- ➔ Painting schedules for aluminium magnesium alloy and FRP sheathing for under water hulls of fishing vessels
- ➔ Development of toxic wood plastic composites (TWPC).
- ➔ Antifouling and anticorrosive paints for protection of fishing vessels
- ➔ Mercury free anodes for cathodic protection of fishing craft
- ➔ Protective coating for cast iron propeller
- ➔ Specifications for cotton and different types of synthetic materials for fabrication of different types of fishing gear
- ➔ Designs of different types of fishing gear for exploitation of the fishery resources
- ➔ Combination wire rope for deep sea fishing
- ➔ Designs of dryers like tunnel dryer, rotary fish meal dryer, electrical fish dryer for cottage scale operation
- ➔ Designs of a deep fat fryer, cutlet moulding machine, inboard/outboard drive, electro-thermal smoke kiln, mechanised processing table, mechanical fish cleaner for spratts
- ➔ Fuel efficient propeller for fishing boats
- ➔ Other fuel saving devices like propeller nozzle
- ➔ Biogas plant from water hyacinth

- ➔ Electronic instruments for fisheries technology, commercial fishing, marine environmental observations, fisheries hydrography, coastal engg. and agricultural investigations. The important ones are Trawl depth meter, Warp load meter, Fishing log, Environmental Data Acquisition System, Speed and distance log and Ship Borne Data Acquisition System.
- ➔ Fishing accessories like trawl winch, power-take-off clutch, gurdy etc.
- ➔ Improved methods for freezing, freeze drying, canning, drying/curing different types of fish and shell fish
- ➔ Hygienic drying of anchoviella on raised platform
- ➔ Cleaning schedules for fish processing establishments and boat decks
- ➔ Method for economic utilisation of low grade fish and conversion of fish wastes into useful by-products
- ➔ Methods for production of value added products like wafers, pickle etc. from fish/shellfish
- ➔ Chlorine level indicator paper for instant reading of chlorine level in water used in fish processing plants
- ➔ Specifications for various types of seafoods, process water and ice for food processing
- ➔ Procedure for implementation of HACCP
- ➔ Methods for extraction of chitin/chitosan from prawn shell waste and their application in textile and poultry industry and in the medical field; pilot plant for production of chitosan
- ➔ Method for extraction of shark fin rays and processing shark cartilage
- ➔ Bacteriological media for 1) Direct plate count of *Alteromonas putrefaciens* and 2) Enumeration of total bacteria in foods containing swarming *Bacillus* sp.
- ➔ An 18 h depuration method to eradicate pathogenic bacteria and grittiness from bivalves, esp, clams and mussels
- ➔ Collagen film from fish skin, bone and air bladder for application in treatment of burns
- ➔ Fine grade absorbable surgical sutures from fish gut
- ➔ Method for isolation of squalene from shark liver oil for use in cosmetics
- ➔ Method for preparation of n-3 polyunsaturated concentrates from fish oils
- ➔ High gel strength agar from sea weeds
- ➔ Improved packaging materials for transportation and storage of fish
- ➔ Device for drawing uniform samples from frozen fish blocks for microbiological evaluation
- ➔ Deodorant for use in fish processing industry
- ➔ Antiseptic ointment for use by prawn handlers

Extension, Education and Training

Training and Demonstration

Subject	Beneficiary	Venue and date
Laboratory techniques for identification of bacteria in fish and fishery products	Four candidates sponsored by fish processing plants	Cochin 31 March-11 April 1997
Quality control of seafoods	Eight candidates	Cochin 21 April-3 May 1997
Fish processing technology	Fifty personnel	Visakhapatnam 5-26 May 1997 (in two batches of 15 days each)
Preparation of mussel pickle	Fifteen women beneficiaries	Kadangode, Kasaragod 13 May 1997
Laboratory techniques for identification of bacteria in fish and fishery products	Seven technologists	Cochin 26 August – 5 September 1997
Seafood quality assurance	Twelve candidates	Cochin 13-25 October 1997
Public health and hygiene practices	Ten EIA officials from Cochin, Bombay, Madras and Calcutta	Cochin 10-15 November 1997
Laboratory techniques for identification of bacteria in fish and fishery products; Quality assurance management.	One candidate from M/s Gadre Marine Exports, Ratnagiri.	Cochin 17 November – 16 December 1997
Fishery technology and extension methods	Five senior officials from Fisheries Dept. and the industry	Cochin 20-26 November 1997
Laboratory techniques for identification of bacteria in fish and fishery products	Seven candidates from fish processing establishments	Cochin 1-12 December 1997

Some of the trainings conducted



Laboratory techniques for identification of bacteria



Quality control of seafoods



Seafood quality assurance



Public health and hygiene practices



Fishery technology and extension methods









Analysis of products/materials

The Institute continued to render technical assistance to the fishery industry by way of testing materials and products manufactured/prepared indigenously, both at its Headquarters at Cochin and Research Centres. In all, 1758 such products / materials were analysed during the year. Samples tested at Headquarters include:

Product/material	No. of samples analysed
Frozen fishery products	238
Canned fishery products	4
Dried fishery products	7
IQF products	35
AFD products	2
Fish by-products	304
Fish speciality products	4
Other products	16
Packaging materials	306
Chemicals	31
Raw materials	1
Detergent	1
Sanitary survey	8
Water	149
Ice	84
Calibration of thermometer	2
Gear materials	13
Craft materials	56
Marine paints	21
Electrical fastenings and fittings	44
Electronic system	1

The Calicut Centre analysed about 46 samples of water, ice and dried fish products, while at Veraval, 250 samples of water, ice as well as fish and fishery products were tested. The Mumbai Centre analysed about 124 samples of frozen products and eleven of ice and water.

Reply to queries

-  Technical queries received from different parts of the country and elsewhere on topics connected with the fishery industry continued to be answered. Some of the topics on which queries were received are listed below
-  Advice on upgradation of quality of masmin
-  Process details of drying fish in tunnel dryer and its advantages over sun drying
-  Comments on certification of sanitary and health conditions of the factory and fitness of the processed products for human consumption
-  Information on seaweeds and their utilisation
-  Information on wound gauze from chitosan
-  Estimate for setting up a fish market at Pangode, Trivandrum.
-  Advice on marine grade steel and FRP laminates

Supply of designs and publications

Three designs of effluent treatment plant, and one each of an otter board and rotary drum dryer were supplied to interested parties on request.

Two copies of the publication 'Indian Food Fishes-Biochemical Composition' were also supplied to two interested parties.

Exhibitions

The Institute actively participated in the following exhibitions during the period

- ★ Trichur Pooram Exhibition 1997, 15 April – 22 May 1997 (conjointly with other ICAR Institutes in Kerala.) The ICAR stall was awarded a gold medal certificate for coming first among the major Central Govt. organisations taking part in the exhibition.
- ★ Exhibition at Alleppey organised by State Dept. of Fisheries in connection with inauguration of project entitled 'Janakeeya Matsya Krishi' 15-17 May 1997

- ★ All India Khadi & Village Industries Exhibition – Khadi Fest '97 -at Calicut, 8-30 December 1997.
- ★ Agriculture Fair 1997 at Trivandrum, 24-27 December 1997.
- ★ Samples were also sent for display at the following two exhibitions



Agriculture Fair at Trivandrum

- ★ IENA '97 exhibition in Germany
- ★ Exhibition held at Pragati Maidan, New Delhi to commemorate 50th Anniversary of Indian Independence, 5-27 November 1997



Trichur Pooram Exhibition

Radio talks / T.V. broadcast

The following radio talks were broadcast during the period.

- *Scope for tiny fish processing units in coastal areas* – Shri K.C.Purushothaman
- *Safe handling of fish* – Dr. T. S. G. Iyer
- *Fish diseases* – Dr. P. K. Surendran
- *Tropical fishery products* – Dr. K. Gopakumar
- *Group activities for economic betterment of fisherwomen* – Dr. Krishna Srinath
- *Fish nutrition and feed production* – Dr. K. G. Ramachandran Nair
- *Fishing vessels* – Shri M. Nasar
- *Protection of fishing vessels* – Dr. K. Ravindran
- *Low energy fishing techniques* – Shri P. George Mathai
- Many of the scientists also took part in the “Answers to Listeners Questions” over Farm and Home Programme.



Awards and Recognition



Dr. C. N. Ravishankar and Dr. Asok Kumar, Scientists, were awarded certificates from the Royal Institute of Public Health and Hygiene, London, on HACCP Principles with credit.



The ICAR has approved starting of an M.F.Sc. course in Post-harvest Technology at CIFT with affiliation to CIFE, Mumbai.



Following the ban on shrimp export to EC nations from India owing to quality defects, The Ministry of Commerce, Government of India constituted two committees, viz. an Inter Departmental Panel (IDP) involving three government agencies including CIFT for preliminary inspection of the plants to oversee whether the sanitary requirements have been met and Supervisory Audit Team (SAT) comprising only CIFT scientists to give final approval. As a result, ban on export of shrimp to EC nations has been lifted and some plants have been approved for resuming exports of their products.

Members of Inter Departmental Panel (IDP) from CIFT representing different regions

Name	Position	Territory
1. Shri P. R. G. Varma, Sr. Scientist	Principal Member	Kerala, Karnataka, Lakshadweep
2. Dr P. T. Lakshmanan, Sr. Scientist	Alternate Member	-do-
3. Shri Sibsankar Gupta Sr. Scientist	Principal Member	West Bengal, Orissa, Andhra Pradesh, Andaman & Nicobar Islands
4. Dr D. Imam Khasim Saheb Sr. Scientist	Alternate Member	-do-
5. Shri K. K. Solanki, Sr. Scientist	Principal Member	Gujarat
6. Dr Ravishankar, Scientist	Alternate Member	-do-
7. Shri S. P. Damle, Sr. Scientist	Principal Member	Maharashtra, Goa, Daman & Diu
8. Dr Asok Kumar, Scientist	Alternate Member	-do-

Members of Supervisory Audit Team (SAT)

PRINCIPAL MEMBERS

1. Dr T. S. G. Iyer, Head of Processing Division
2. Dr M. K. Mukundan, Head of Quality Assurance & Management Division

ALTERNATE MEMBERS

1. Dr P. K. Surendran, Head of Microbiology, Fermentation & Biotechnology Section
2. Dr Francis Thomas, Sr. Scientist

Dr. Gopakumar elevated to the post of DDG (Fisheries)

Dr K. Gopakumar, Director, Central Institute of Fisheries Technology joined the Indian Council of Agricultural Research (ICAR) headquarters as Deputy Director General (Fisheries) on 21 November 1997. Dr Gopakumar has wide research management experience in the field of fisheries. He has worked as an international consultant/expert and chaired international meetings. He is the recipient of many awards and honours, including the ICAR team award for outstanding team research and the prestigious Rafi Ahmed Kidwai Memorial Award for valuable contribution to the field of fisheries technology.



Ad-hoc/Sponsored/Collaborative Programmes

The following are the Ad-hoc/Sponsored / Collaborative projects /Programmes undertaken at the Institute

- Design, construction, performance, monitoring and popularisation of a new series of deep sea fishing vessels – *ICAR ad-hoc project*
- Harvest technologies – Assessment of marine living resources research on board FORV *Sagar Sampada* – *DOD sponsored project*
- Processing and test marketing of fish curry in retortable pouches – *MPEDA sponsored project*
- Post-harvest technology of crabs with special reference to value added products from crab meat – *ICAR ad-hoc project*
- Autolytic activity in mackerel and squid mantle muscle – *ICAR ad-hoc project*
- Value added marine products – *CIFT-MPEDA collaborative programme*
- Value added products from low cost fish and their quality improvement – *collaborative programme with Ministry of Food Processing Industries*
- Selectivity of trawl nets with respect to commercially important species of fin fish and shellfish caught off Cochin, South west coast of India – *ICAR ad-hoc project*
- Occurrence of *Vibrio vulnificus* in tropical marine fish and development of methods for their eradication. – *ICAR ad-hoc project*
- Occurrence, effect of processing and survival of halophilic pathogenic *Vibrios* in fishery products of the export trade – *ICAR ad-hoc project*
- Selective bio-accumulation of toxicants in cephalopods (viz. squid and cuttle fish) and changes in quality, its upgradation and safety of processed products – *ICAR ad-hoc project*
- Studies on ecology and behaviour of blow fly population in fish processing and storage system with respect to development of a target system for pest control – *CIFT - University of Bristol, U.K. collaborative project with ODA funding.*
- Development and application of electronics for agricultural field investigations – *ICAR ad-hoc project*

(Details of these projects are given in the reports of the respective division/
section)

Technical Guidance / Consultancy

The Institute continued to render technical guidance to entrepreneurs in setting up establishments for fishing and fish processing and to the Central and State Depts. as well as interested parties in carrying out their various programmes on a technical consultancy basis. Some of the technologies transferred/ work undertaken are briefly mentioned below

Name of the party	Subject
M/s Miranda Exports, Nagercoil	Processing of shark fin rays
BOBP, Madras	Survey of dried fish processing in the East and West Coasts of India
M.A. Ummar, Trichur	Processing of shark cartilage
M/s Blue Bay Exports (P) Ltd., Cochin	Processing of shark cartilage
SPAMCHE Industries, Cochin.	Production of chitin/chitosan
FAO, Rome	Utilisation of fish waste in the Republic of Maldives
Ministry of Agriculture, Govt. of India	Design of a new series of 18m deep sea trawler and 18 m gill netter-cum-longliner
M/s Yedugiri Seafoods, Cochin	HACCP programme on fishing vessels

In addition to the above, the Institute has rendered technical assistance to various parties by way of disseminating information on various topics related to fishing and fish processing. Some of the informations transferred were on:

- survey and inspection of fishing vessels
- setting up a quality control laboratory
- production of surimi from fish available on the Gujarat coast
- process for curing sharks to two processors from Andaman Islands
- detailed specification and cost estimate of equipments and machinery required for 4-5 tonnes/day cap. fish feed plant

The scientists/technical officers were also invited to take classes for participants of refresher courses, training programmes, students of educational institutions etc.



View of the inside of the fish meal-cum masmin flake plant set up at Lakshadweep under CIFT technical guidance

Management Committee

The 36th Management Committee of the CIFT was reconstituted with the following members for a term of 3 years w.e.f. 24.10.1997.

Chairman (Ex-Officio) – DIRECTOR, CIFT, Cochin

Members

1. Director of Fisheries, Dept. of Fisheries, Govt. of Kerala, Trivandrum
2. Director of Fisheries, Dept. of Fisheries, Govt. of Karnataka, Bangalore
3. Dean, Faculty of Fisheries, Kerala Agril. University, Panangad
4. Shri Ponadmanda Ramachandra Rao, H.No.60-1-35, Jagannaikpur, Kakinada Post, East Godavari Dist-1, A.P.
5. Shri Samir Kumar Mahaseth, MLA, Qtr. No.4, New Family-Type, Road No.3, R.Block, Patna-800001, Patna, Bihar

6. Dr R. A. Selvakumar, Asst. Director General (Marine Fisheries), ICAR, Krishi Bhavan, New Delhi
7. Sr. Fin. & Accounts Officer, CMFRI, Cochin.
8. Dr K. Devadasan, Head, Divn. of Biochemistry & Nutrition, CIFT, Cochin
9. Shri K. K. Balachandran, Principal Scientist., CIFT, Cochin
10. Shri D. K. Garg, Sr. Scientist, Mumbai Res. Centre of CIFT
11. Shri A. A. Khan, Sr. Scientist, Burla Res. Centre of CIFT

Member Secretary

Senior Administrative Officer, CIFT, Cochin

The Committee met once on 24 June 1997

Institute Joint Council

The Institute Joint Council which was reconstituted with effect from 21 January 1996 for a period of 3 years functioned with the following members:

Chairman

Director, CIFT, Cochin

Members - Official Side

1. Dr K. Devadasan, Head, Division of Biochemistry & Nutrition
2. Dr T. S. Gopalakrishna Iyer, Head, Divn. of Fish Processing
3. Shri M. Nasar, Sr. Scientist
4. Sr. Administrative Officer / Admn. Officer
5. Asst. Fin. & Accounts Officer

Secretary - Official Side

Shri A.C. Joseph, Sr. Scientist

Members - Staff Side

1. Shri K. U. Shaik, T-II-3
2. Shri Y. Kanaka Raju, Jr. Clerk
3. Shri P. A. Thomas, SSG.IV
4. Shri K. N. Velayudhan Kutty, SSG.II
5. Vacant

Secretary - Staff Side

Shri M. K. Kuttykrishnan Nair, T-5

Action is being taken to conduct by-election to the vacant seat in the Administrative and Technical category. The Council met thrice during the year.

Staff Research Council

The Staff Research Council met on 24 June 1997. Dr Alfred Selvakumar, ADG (M.Fy.), Dr K. Gopakumar, Chairman, SRC, Head of Divisions / Section and all Project Leaders attended the meeting. The progress of the various research projects at Headquarters and Research Centres was reviewed for the period 1 October 1996 to 31 March 1997.

Significant recommendations / decisions taken were:-

- Bring out bulletin giving all aspects of design and drawing pertaining to inland fishing gear
- Take up more consultancy projects to generate revenue

Project Advisory Committee

The Project Advisory Committee with the following as members met five times during the period under report.

Chairman

Dr K. Ravindran, Head,
Divn. of Fishing Technology

Members

1. Dr K. Devadasan, Head,
Divn. of Biochemistry & Nutrition
2. Dr M. K. Mukundan, Head,
Divn. of Quality Assurance & Management
3. Dr T. K. Sivasdas, Principal Scientist
4. Dr A. K. Kesavan Nair, Principal Scientist
5. Dr P. K. Surendran, Principal Scientist

Member Secretary

Dr T. S. G. Iyer, Head, Divn. of Fish Processing

Important observations / recommendations / decisions taken at the meetings are reproduced below.

- Conduct further studies on preparation of battered and breaded shrimps in butterfly form with extended shelf life for adoption on commercial scale
- Take up pilot plant studies on surgical sutures and prepare detailed engineering drawing for suture production line
- Prepare monograph on bacterial flora of fish

Participation in Symposia / Seminars etc.

Particulars of Seminar / Symposia/ Workshop etc	Organised by / Venue & Date	Participant(s)
WITHIN THE COUNTRY		
Seminar on Technology Transfer	Malapuram Dist. Admn., in association with Kerala State Small Industries Association, 15 April 1997	Shri. A. C. Joseph
Workshop on Turtle Excluder Device (TED)	National Marine Fisheries Service of US in collaboration with MPEDA, 5-6 May 1997	Dr. K. Ravindran Shri. R. S. Manoharadoss
ASTRA / ERDC '97 Conference	Trivandrum 8-10 May 1997	Dr. T. K. Sivasdas
Interinstitutional NATP Project Workshop	FAO-WB 29 May - 4 June 1997	Dr. K. Ravindran Dr. T. S. G. Iyer Dr. K. K. Balachandran Dr. K. G. Ramachandran Nair
Workshop on Marine Fisheries of Andhra Pradesh	AFPRO, Hyderabad 27-28 June 1997	Shri. G. Narayanappa
Workshop on Problems and Prospects in Undertaking Post Harvest Fisheries Activities in Orissa, Bhubaneswar	ODA	Shri. Sib Sankar Gupta
Workshop to commemorate Golden Jubilee Celebrations of Indian Independence	Fishery Survey of India 15 August 1997	Shri. D. K. Garg
Colloquium on Key Issues Relating to Fisheries Sector	MPEDA, Cochin, 14-15 October 1997	Dr. Krishna Srinath Shri. K. K. Kunjipalu Shri. M. Nasar Shri. N. Subramonia Pillai Smt. Leela Edwin
National Agricultural Technology Project Orientation Workshop	T. Nadu Veterinary and Animal Science University, Chennai 27 October 1997	Dr. K. G. Ramachandran Nair
Discussion in connection with establishment of Krishi Vigyan Kendra in U.T. of Lakshadweep	Lakshadweep 3-4 November 1997	Dr. K. Gopakumar Dr. Krishna Srinath
Conference on Formulation of Income Generating Projects for the Benefit of Fisherwomen	Matsyafed, Trivandrum 10 November 1997	Dr. Krishna Srinath

Particulars of Seminar / Symposia/ Workshop etc	Organised by / Venue & Date	Participant(s)
Motivational Programme to Promote Food Processing Industries	Small Industries Service Institute, Trichur in association with SSM Polytechnic, Tirur, 12 November 1997	Shri. K. George Joseph
Workshop on the Changing Roles of Women in Indian Society	Cochin 22 November 1997	Dr. Krishna Srinath
National Seminar on Functional Hindi	Department. of Hindi CUSAT, Cochin – 23-25 November 1997	Dr. Jessy Joseph
ICAR Workshop on Agricultural Drainage Engineering	Punjab Agricultural University, Ludhiana, 23-30 November 1997	Dr. T. K. Sivadas
Workshop on People's Participation in Development	Development Action thRough Self-Help Network (DARSHN) and Kerala Institute of Local Administration (KILA), Trichur 28-29 November 1997	Dr. Krishna Srinath
National Workshop on Technological Empowerment of Women in Agriculture	M.S. Swaminathan Research Foundation, Madras, 3-4 December 1997	Dr. Krishna Srinath
National Symposium on Ocean Electronics	CUSAT, Cochin, 16-17 December 1997	Shri. V. Vijayan Dr. M. D. Varghese
National Seminar in Official Language on Harvest and Post Harvest Technology of Fish	Cochin 22-23 December 1997	(A number of Scientists of the Institute)
National Seminar on Coastal Zone Management	Manonmaniam Sundaranar University, Nagercoil 30-31 December 1997	Dr. Krishna Srinath
ABROAD		
Member of Joint FAO/NACA/ WHO study group on Food Safety Issues	Bangkok, Thailand 22-26 July 1997	Dr. K. Gopakumar
FAO Workshop on Selective Shrimp Trawling	Darwin, Australia 24-26 July 1997	Shri. N. Subramonia Pillai

Participation in Training Programmes

Name of Course	Organisation/ Venue & Date	Participant (s)
<i>WITHIN THE COUNTRY</i>		
Course on Videography	Shramik Vidyapeeth (Polyvalent Education Centre) Human Resource Development Govt. of India, Trivandrum 28 April – 11 August 1997	Shri.C.Subash Chandran Nair
Foundation course of Agricultural Research Services	NAARM, Hyderabad	Dr. R.Raghu Prakash
XXXVI Training course on Use of Computers in Agricultural Research	Indian Agricultural Statistics Research Institute, New Delhi, 21 July - 3 August 1997	Shri. G.R. Unnithan
Computer training programme for ARIS personnel (conducted by M/S STG International Ltd.)	University of Agricultural Sciences, Bangalore, 4-12 September 1997	Dr. P.T. Mathew Shri. K. Ramakrishnan
Wood Preservation with Special Reference to Boring Activities in Wooden Hulls	Cochin 7-17 October 1997	Shri. Pravin Puthra Shri. Prem Kumar
Modern Trends in Packaging	Indian Institute of Packaging, Cochin 22 October 1997	Shri. K.P. Antony
Isolation and Identification of <i>Vibrio cholerae</i>	Cochin	Dr. Arnab Sen
Introductory Course on Windows and MS Office	NAARM, Hyderabad 3-13 November 1997	Smt. Leela Edwin Shri. K.K. Sasi Kum. Smitha K.
<i>ABROAD</i>		
UN Convention on the Law of the Sea- Agenda 21- and its Implementation	International Ocean Institute, Dalhousie University, Halifax, Canada 9 June - 15 August 1997	Dr. B. Meenakumari
Regional Training Course on Hydraulic Machinery	SEAFDEC, Thailand 18 August - 17 September 1997	Shri. K.J. Francis Xavier
Fishing, Preservation and Processing of Krill and Antarctic Fish	Poland (under Indo - Polish Agreement on Science and Technology) 20 August – 1 October 1997	Shri. Pravin Puthra

Workshop/Seminar/Farmer's Day etc. conducted

Workshop

The Institute in collaboration with the Marine Products Export Development Authority conducted a Workshop on Extension Training at Cochin on 11 – 12 August 1997. About twenty extension development officials from MPEDA attended the Workshop.

'Women in Agriculture' Day

The Institute's Headquarters observed 'Women in Agriculture' Day on 4th December by holding a fruitful discussion with the rural fisherwomen population of Kandakadavu, a fishing village in Cochin. Some of the scientists of the Institute spoke on matters relating to fish in nutrition, hygiene and health, fish handling and processing and fish conservation.



'Women in Agriculture' day at Kandakadavu, Cochin

More than fifty women comprising members of Kandakadavu Harijan Society and other women societies in and around the area participated in the deliberations.

At Veraval, students from local schools were briefed on the activities of the Centre and the various achievements attained during the last few years.

At Calicut, a training programme was organised in which eight women sponsored by the Calicut Coastal Women's Federation were given training in preparation of fish and shellfish pickles and chutney powder from mussel meat.



Women being trained in preparation of pickles at Calicut

Administration

The Administration Division deals with recruitment, service & policy matters, discipline, staff welfare, land & building, procurement of stores, budget expenditure, settlement of claims etc.

The Research Centres at Burla, Hoshangabad and Calicut continued to function in rented buildings. Research Centres at Mumbai, Veraval & Visakhapatnam functioned in their own buildings.

Five yearly assessment of Technical Staff for the period upto 31 December 1996 was completed and orders issued.

DPCs / Selection Committees met during 1 April 1997 to 31 December 1997 for clearance of:-

- | | | | |
|----|----------------|---|---------|
| a. | Probation | — | 3 times |
| b. | Permanency | — | Once |
| c. | Promotion | — | 3 times |
| d. | Efficiency Bar | — | Once |

Posts filled during 01.04.1997 to 31.12.1997

	Direct Recruitment	Promotion/ Deptl. Test
Scientific	8	—
Technical	2	13
Administrative	2	1
Supporting	5	23
Auxiliary	—	—

Staff Position as on 31.12.1997

	Sanctioned	Filled
Scientific	101	98
Technical	184	167
Administrative	104	97
Supporting	129	111
Auxiliary	7	6
	525	479

Technical Section

Compilation of Research Project Programmes:

The various research project programmes of the Institute for the year 1997-98, comprising 24 Institute projects and 8 ad-hoc projects were compiled as per the revised proforma (RPF I), taking into consideration the recommendations of the PAC, RAC, SRC, Institute Management Committee etc. and brought out in the form of a book on the due date.

Preparation and submission of technical reports:

- a) **Monthly report:** Materials for the preparation of monthly report to DARE on the important activities of the Institute viz. significant research findings, training programmes, exhibitions, seminars, workshops etc. conducted, important policy decisions taken, visits of Officers abroad, particulars of new projects undertaken etc. were collected from various Divisions at Headquarters and Research Centres, compiled and sent to Council regularly for inclusion in the

monthly report of DARE for programme implementation.

- b) **Annual Action Plan 1997-98:** The quarterly progress report on the activities of the Institute was compiled and sent to Council regularly for incorporation of the same in the Annual Action Plan of ICAR/DARE.

Maintenance and updating of Project leaders' files

The Project leader's files of all the ongoing research projects were updated by collecting the consolidated quarterly reports, individual half yearly reports, annual reports and final reports from the concerned project leaders and associates.

Ad-hoc /collaborative project programmes:

Correspondence and follow-up action with regard to various ad-hoc projects, NATP projects, inter institutional and foreign collaborative projects were carried out.

Regional committee meetings:

Detailed report on the various aspects of research and extension work carried out at the Mumbai Research Centre of CIFT for the last two years was furnished to Council for presentation in the Regional Committee meeting of Region No.VII.

Staff Research Council meeting:

During the reported period the Staff Research Council met once to review the progress of research projects handled at the Institute Headquarters and Research Centres.

Divisional meetings:

Monthly meetings of all the HODs are arranged regularly to discuss various matters concerning the Divisions.

Publication of research papers:

Meetings of the Scrutiny Committee were convened on the occasions to consider the suitability of papers, presented by the authors, for publication. During the reported period 40 papers were processed and Director's approval for publication / presentation of 30 papers was communicated to the respective authors.

Other technical matters:

In addition to the above, the Technical Section also monitors matters relating to DPC of scientists, awards / Fellowships, scientific talks, bio-data of scientists etc.

Official Language Implementation

During the period under report CIFT implemented Official Language Implementation programmes as per the instructions issued by Government of India, Department of Official Language, Ministry of Home affairs.

OLIC Meetings

The quarterly OLIC meetings of the Institute (with the following members) reviewed the implementation activities of CIFT.

Chairman : Director

Members :

1. HOD, Fishing Technology
2. HOD, Fish Processing
3. HOD, Biochemistry & Nutrition
4. HOD, Extension, Information & Statistics
5. HOD, Quality Assurance & Management
6. HOD, Engineering
7. HOS, Microbiology, Fermentation & Biotechnology
8. Sr. Administrative Officer
9. Asst. Fin. & Accounts Officer

Member Secretary : Asst. Director (OL)

Four quarterly meetings were conducted during the period.

Reports

The quarterly, half yearly and annual reports pertaining to Headquarters and Research Centres were forwarded to Council for inclusion in the report of the Secretariate.

Inspection of Parliamentary Committee on Official Language

Second Sub Committee of the Committee of Parliament on Official Language headed by Smt. Veena Varma, Parliament Member, visited the Institute on 14 January 1997. The other members of the sub committee included Dr A.K. Patel, M.P., Shri Haribansh Sahai, M.P., and Shri Jai Prakash, M.P.

Golden Jubilee Celebration of Indian Independence

1. **'Bharatheeyam' - Quiz competition :** In connection with Golden Jubilee of the Independence of our Nation, Hindi Quiz competition 'Bharatheeyam' was conducted on 14 August 1997 at the Institute. The area of competition was fixed as Indian culture, literature and history. There were 8 teams comprising 3 members in each from the 8 Divisions of the Institute.

2. National Seminar in Official Language on Harvest and Post Harvest Technology of Fish :

A two day National Seminar in Official Language on Harvest and Post Harvest Technology of Fish was conducted on 22 and 23 December 1997 in commemoration of the Golden Jubilee year of the Independence of our Nation. The Seminar was inaugurated by Dr C. P. Varghese, Director, CIFNET, Cochin and presidential address was delivered by CIFT Director Dr K. Ravindran. Felicitation addresses were delivered by Shri Anil Kumar Dube, Director (Hindi), ICAR, New Delhi and Smt. Jayashree Shanbagh, Deputy Director, All India Radio, Cochin. A total of eleven papers were presented. Proceedings of the Seminar was also published.

Hindi Samaroh

As in the yesteryears CIFT celebrated Hindi Samaroh from 2 – 11 September 1997. Prior to the Hindi Samaroh, competitions were started from July 1997 onwards. The whole institute was divided into 8 divisions. Group wise and item wise competitions were conducted.

The concluding day of the Hindi Samaroh was conducted on 11 September 1997. Chief Guest of the occasion was Dr K. Babu Joseph, Vice Chancellor, University of Science and Technology, Cochin, who gave away the Rolling trophies for the best division of the Institute and individual competitions winners. Felicitation speeches were made by Shri G.S. Dharasing, Vice President, Dhakshin Bharat Hindi Prachar Sabha, Cochin and Dr A. Aravindakshan, Professor in Department of Hindi, Cochin University of Science and Technology.

Seminar - Apna Vibhag

A Seminar "Apna Vibhag" was conducted on 9 September 1997 in Official Language. Papers were presented in Hindi on different aspects of fisheries dealt by all the Divisions of CIFT.

Joint Hindi Fortnight

Under the auspices of Cochin TOLIC, Joint Hindi Fortnight was celebrated from 17 – 25 November 1997 with various competitions in which CIFT also participated.

Hindi Workshop

During the period under report three Hindi workshops were conducted as given below:

- Hindi Workshop – 5 – 7 May 1997 for 15 Administrative personnel
- Hindi Workshop – 13 – 15 October 1997 for 14 Administrative personnel
- Hindi Workshop – 9 – 11 December 1997 for 16 Scientists

Publications

Annual report 1996-97, Research Highlights - 1996-97 and proceedings of Seminar in official language on Harvest and Post Harvest Technology of Fish were brought out.

Rajbhasha Rolling Trophy

For the best performance in Official Language Implementation in the Office, CIFT secured the second position among the members of the CTOLIC whose staff strength is more than 200.



Dr. K. Gopakumar, Director, CIFT receiving the Rajbhasha rolling trophy on behalf of the Institute.

Library

The Library continued to provide library and documentation service to the scientific and technical staff of the Institute. The service was also extended to 116 research scholars, 163 students from various Universities, 53 scientists from other institutes and 116 technologists from the industry. During the period 154 books were added to the collection and at present there are 8162 and 4966 bound volumes of scientific journals. Eighty three journals were subscribed to during the year. During

the period under report 829 publications were issued and retrieved. The reprographic unit of the library made copies and supplied 73,000 pages of documents on requisition. The library continued to issue the 'Current Contents on Fishery Technology' (Quarterly) for the benefit of the users. The library continued to act as an ASFA (Aquatic Science and Fisheries Abstracts) input centre in association with National Institute of Oceanography, Goa.

Visitors to the Institute

The following are some of the dignitaries who visited the Institute's Headquarters as well as Research Centres during the period.

- Prof. Milton Fingerman, Chairman. Dept of Ecology, Evolution and Organismal Biology, Tulane University, USA.
- Shri M. F. Parmar, Jt. Commissioner of Fisheries, Gujarat State.
- Shri Chathuranan Misra, Hon'ble Minister for Food and Agriculture.
- Shri. S. K. Mathur, Indian Ambassador to Yugoslavia.
- Vice Admiral Madhvendra Singh, AVSM, Flag Officer Commanding-in-Chief, Southern Naval Command.
- Dr R. S. Paroda, DG, ICAR
- Dr P.V. Dehadrai, DDG(M.Fy) ICAR.
- Dr Alfred Selvakumar, ADG (M.Fy.), ICAR.
- Dr P. Das, DDG (Agril.Extn.), ICAR.
- Shri. Oscar Fernandez, M.P., New Delhi.
- Dr. P. N. Jha, Member, ICAR Governing Body
- Shri. K.K. Gupta, Jt. Secy. to Govt. of India, Ministry of Food Processing Industries
- Dr. B. U. Nayak, Director, Central Water and Power Research Station, Khadakwasla Research Station, Pune
- European Community delegation comprising Dr. Vittorio Ferro, Veterinary Inspector and Dr. Thanasis Zambas, Veterinarian, Directorate of Public Health, Govt. of Greece, Athens
- Dr. Peter Wareing, NRI, UK
- Dr. John Essar, University of Lincolnshire and Humberside, Grimsby, U.K.

They visited cift



Shri Chathuranan Mishra



European Community delegates



Shri Oscar Fernandez



Vice Admiral Madhvendra Singh



Shri S. K. Mathur

Managerial Staff

DIRECTOR

Dr. K. GOPAKUMAR

(up to 20 November 1997)

Dr. K. RAVINDRAN

Acting Director from 21 November 1997

HEAD OF DIVISION / SECTION

- | | | |
|--|---|--|
| 1. Fishing Technology Division | : | Dr. K. RAVINDRAN, Head of Division |
| 2. Fish Processing Division | : | Dr. T. S. GOPALAKRISHNA IYER, Head of Division |
| 3. Biochemistry & Nutrition Division | : | Dr. K. DEVADASAN, Head of Division |
| 4. Quality Assurance & Management Division | : | Dr. M. K. MUKUNDAN, Head of Division |
| 5. Engineering Division | : | Dr. T. K. SIVADAS, Principal Scientist |
| 6. Extension, Information & Statistics Division | : | Dr. A. K. KESAVAN NAIR, Principal Scientist
(till 17 September 1997)
Dr. KRISHNA SRINATH, Head of Division
(from 18 September 1997) |
| 7. Microbiology, Fermentation & Biotechnology Section | : | Dr. P. K. SURENDRAN, Principal Scientist |
| 8. Technical Section | : | Shri A. VASANTHA SHENOY, Senior Scientist |
| 9. Library | : | Shri H. KRISHNA IYER, Principal Scientist |

ADMINISTRATION AND ACCOUNTS

- | | | |
|--------------------------------|---|--|
| Senior Administrative Officer | : | Shri NAND KISHORE (from 17 September 1997) |
| Administrative Officer | : | Shri G. SASIDHARAN |
| Asst. Finance & Accts. Officer | : | Shri P. A. UTHUP |

SCIENTIST-IN-CHARGE OF RESEARCH CENTRES

- | | | |
|--|---|--|
| Veraval Research Centre | : | Shri K. K. SOLANKI, Principal Scientist |
| Visakhapatnam Research Centre | : | Shri G. NARAYANAPPA, Principal Scientist |
| Burla Research Centre
Hoshangabad Research Centre } | : | Shri ANWAR AHMED KHAN, Sr. Scientist |
| Mumbai Research Centre | : | Shri D. K. GARG, Sr. Scientist |
| Calicut Research Centre | : | Shri K. GEORGE JOSEPH, Sr. Scientist |

Infrastructure Development

Buildings & related facilities

The construction of two more wings on the second floor of the Institute was completed during the year. A lift has also been recently added to the office-cum-laboratory building.



Dr R. S. Paroda, Director General, ICAR
in the ARIS Cell

Inauguration of ARIS Cell

The Director General, ICAR, Dr R.S. Paroda, inaugurated the ARIS (Agricultural Research Information System) Cell, set up at the Institute, on 17 July 1997. This provision has facilitated the Institute becoming part of a computerised information network linking the ICAR Institutes and agricultural universities in different parts of the country, and will provide an avenue for exchange of information both within and outside the country.

Inauguration of CIFT Guest House

The CIFT Guest House at the CIFT Residential Complex was inaugurated on the same day by the Director General. The inaugural function was presided over by Dr P.V. Dehadrai, then DDG (Marine Fisheries). The Guest House has eight well furnished double rooms with all essential facilities.



CIFT guest house

The Director General, ICAR
inaugurating the
CIFT guest house



Keel for fishing vessel laid

The keel for a 15.5m. fuel efficient deep sea steel fishing vessel was laid by Dr K. Gopakumar, DDG (Fy.) at a simple ceremony held at the Institute on 27 December 1997. Dr K. Ravindran, Director, CIFT, presided over the function.

Inauguration of construction of the vessel was held earlier on 4 December 1997. The vessel which is designed to save about 20% fuel compared to similar size vessels presently used by the fishing industry will be a boon to the industry under the ever increasing fuel prices.



Dr K. Gopakumar, DDG(F), ICAR laying the keel
for the 15.5m steel trawler

Golden Jubilee Celebrations

The Institute set a start to the Golden Jubilee Celebrations of India's Independence on 15th August, 1997. The programme included Vandematharam, flag hoisting, national anthem, planting of golden jubilee trees and *desh bhakti ganam* followed by cultural programmes. The staff with their family members participated in the programmes.

As a part of the celebrations the Institute organised six training programmes on different subjects. The revised edition of a book on the Biochemical composition of Indian food fish was published. A quiz programme and a national seminar on official language were also organised. Details of these are reported elsewhere.

Women's Cell

As per instructions from Government of India and the ICAR, the CIFT Women's Cell started functioning at the Institute from 29 April 1997. Dr P. J. Cecily, Technical Officer (T-9) was nominated by the Director to function as the Liaison Officer of the Cell.

At a meeting held on 30 July 1997, Dr George Kallingal, a Psychologist based in USA gave a talk on Stress Management for the benefit of the members of the Cell.

The Cell aims at protecting the interests of the female employees, improving their status and service conditions and looking after their welfare in general.



Dr George Kallingal addressing the members of the Women's Cell

ICAR Sports

A twenty three men and eight women contingent from CIFT participated in the ICAR Zone-III Inter-institutional sports meet held in Coimbatore from 5 - 10 November 1997. The women athletes of CIFT were outstanding in their performance as they claimed gold medals in 100m, javelin throw and high jump events, silver medals in discus throw and long jump and third places in 200m, javelin and shot put.

They also cornered the team championship in the shuttle badminton event. The men's football team reached the semi-finals and secured third place in the 400m event.

DST Meeting

The Institute hosted the Department of Science and Technology meeting on Geo-scientific, agri-electronic test and measuring instruments on 17 November 1997. Officials of Department of Science and Technology, Chairman and Members of Working Group and scientists of various connected departments participated in the meeting.

Publications

- Annamalai, V., Kandoran, M.K. & Nair, T.S.U. (1997) - Economic aspects of fish curing - *Fish Tech. Newsletter* 8 (1&2) : 7
- Asok Kumar, K., Ravishankar, C.N., Badonia R. & Solanki, K.K. (1997) - Green discoloration in silver pomfrets - A case study - *Fish Tech. Newsletter* 8 (1 & 2) :10
- Badonia, R., Ravishankar, C.N., Asok Kumar, K. & Solanki, K.K. (1997) - Diversification in export of fin fishes from Gujarat - *Seaf. Exp. J.* 28 (4) :23
- Badonia, R., Ravishankar, C.N., Asok Kumar, K. & Solanki, K.K. (1997), - Training programme on histamine and indole in seafoods - *Fish Tech. Newsletter*, 8 (1&2) :6
- Balachandran, K.K. & Srinivasa Gopal, T.K. (1997) - Packaging of value added products - Paper submitted for monographs in Food Packaging to be published by Indian Institute of Packaging, Bombay.
- Bihari Bankey, Balasubramaniam, S & Kandoran, M.K. (1997) - Analysis of key communicator and non-key communicators among fishermen - *Fish. Technol.* 34 (2) :40
- Cecily, P.J. (1997) - Appropriate strategies for development of women in fisheries - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22 -23 December
- Dawson Percy (1997) - Reservoir fishing with special reference to Hiraakud Reservoir - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 December
- Devadasan, K. (1997) - Dietary fish and cardio vascular diseases - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 December
- Gopal, T.K. Srinivasa, Jose Joseph & Balachandran, K.K. (1997) - Development of fish products employing hurdle technology - Paper submitted for presentation at Seminar on Development of Food Products Employing Hurdle Technology at Defence Food Res. Lab., Mysore, 29-30 December
- Gopal, T.K. Srinivasa (1997) - Packagings for frozen fish and fish by-products - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 Dec.
- Gupta, Sib Sankar (1997) - Potential for using fish mince for production of value added products - Paper presented at Workshop on Problems and Prospects in Undertaking Post Harvest Fisheries Activities in Orissa, Bhubaneswar, 18 June.
- (Hassan Femeena, Sajan George, Saleena Mathew) & Mukundan, M.K. (1997) - Evaluation of two empirical devices for measurement of fish texture - *Fish. Technol.* 34(2): 15
- Joseph, A.C. (1997) - Food processing with special emphasis on fish processing, value added products - Paper presented at Seminar on Technology Transfer conducted by Malapuram Dist. Admn. in association with Kerala State Small Industries Assn., 15 April.
- Joseph, K. George (1997) - Scope for fish processing industries - Paper presented at Motivational Programme to Promote Food Processing Industries organised by Small Industries Service Institute in association with S.S.M. Polytechnic at Tirur, 12 November.
- Kunjipalu, K.K., Varghese, M.D., Boopendranath, M.R., Subramonia Pillai, N & Meenakumari, B. (1997) - Results of fishing experiments with square mesh cod end of demersal trawls - *Proc. Technological Advancements in Fisheries - Publn. No.1*(M.S. Hameed and B.M. Kurup Edn.) , School of Industrial Fisheries, CUSAT : 197
- Manoharadoss, R.S., Annamalai, V., Pravin, P. & Kandoran, M.K. (1997) - Returns from motorised traditional craft in Veraval coast - *Fish. Technol.* 34 (2) : 35
- Manoharadoss, R.S. (1997) - Inland fishing gear and their operation - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 December.

Muraleedharan, V., Antony, K.P., Perigreen, P.A. & Gopakumar, K. (1997) - Surimi from five Indian fish species - *Tropical Sc.*, 3

Muraleedharan, V. & Gopakumar, K. (1997) - Utilisation of trawl by-catch for surimi preparation - *FAO Fisheries Report No.563* - APFIC. - Summary report of papers presented at Tenth Session of Working Party on Fish Technology and Marketing, Colombo

Mohan Braj (1997) - Socio-economic problems of fishermen - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 December.

Nair, K.G. Ramachandran (1997) - Fishery by-products - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 December.

Nasar, M. (1997) - Multipurpose fishing vessels for the 21st century - Paper presented at Colloquium on Key Issues Relating to the Fisheries Sector, Cochin, 14-15 October.

Pillai, N. Subramonia (1997) - Cooperation between developing and developed countries in fishing technology - experience in India - Paper presented at Workshop on Selective Shrimp Trawling with Selective Devices, Darwin, Australia, 24-26 July.

Pravin, P. (1997) - Assembling, fabrication and mending of trawl nets - A gainful employment in Gujarat - *Fishing Chimes*, 17 (8)

Pravin, P. & Ramesan, M.P. (1997) - Hull maintenance of fishing boats at Veraval - *Fishing Chimes*, 17 (1)

Ramakrishnan, K. (1997) - Electronic equipments for safety and efficiency in fishing operations - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 December.

Ramakrishnan, K., Vijayan, V. & Varghese, M.D. (1997) - Development of net-height meter for measurement of vertical opening of trawls - Paper presented at National Symposium on Ocean Electronics, CUSAT, Cochin, 16-17 December.

Ramesan, M.P., Pravin, P. & Manoharadoss, R.S. (1997) - Handline fishery of Veraval - *Fishing Chimes*, February.

Ravishankar, C.N., Asok Kumar, K., Badonia, R. & Solanki, K.K. (1997) - Similarity between the cooked meat of pomfret and trigger fish - *Fish Tech. Newsletter* 8 (1&2) 9

Sanjeev, S. (1997) - *Vibrio vulnificus* - an emerging pathogen - *Fish Tech. Newsletter* 7 (10&11):7

Sivadas, T.K. (1997) - Sensors, electronics and systems for agriculture and irrigation management - Paper presented at ASTRA / ERDC - 97 Conference at Trivandrum, 8 - 10 May.

Srinath Krishna & Balasubramaniam, S. (1997) - The role of women in coastal Zone Management - Paper presented at National Seminar on Coastal Zone Management arranged by Mananmaniam Sundaranar University, Nagercoil. 30-31 December.

Surendran, P.K. (1997) - Probiotic bacteria and fish preservation - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 December.

Varma, P.R.G. (1997) - Use of HACCP in seafood processing - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 December.

Vijayan, P.K. (1997) - Histamine in fish and fish products - *Fish Tech. Newsletter* 8 (1 & 2) : 5

Vijayan, V. (1997) - Offshore technique - Paper presented at National Seminar in Official Language on Harvest and Post Harvest Technology of Fish, Cochin, 22-23 December.

Other publications brought out include :-

- Tropical fishery products - by Dr K. Gopakumar Published by Oxford & IBH Publishing Co. P. Ltd., 66, Janpath, New Delhi - 110 001
- Post harvest handling and transportation of fish (*Booklet*)
- Biochemical composition of Indian food fish (*Revised edition*)
- Fish Technology Newsletter Vol.VIII, No. 1&2
- Research Highlights 1996 -97

प्रस्तावना

केन्द्रीय मात्स्यकी प्रौद्योगिकी संस्थान, भौगोलिक दृश्यविधान के सन्दर्भ में, समुद्री एवं देशज मात्स्यकी क्रियाकलापों की विस्तृत मानावली से संबंधित समस्याओं पर अभिभाषण देने योग्य आधारीय एवं अनुप्रयुक्त अनुसंधान कार्य करता है ।

इस रिपोर्ट में मत्स्यन, मत्स्य संसाधन एवं संबद्ध विषयों से संबंधित विभिन्न अनुसंधान एवं विकास, विस्तार एवं शैक्षणिक क्रियाकलापों की सूचना शामिल है । देश के मात्स्यकी व्यवसाय द्वारा सामना की जानेवाली प्रमुख प्रौद्योगिकीय समस्याओं को ध्यान में रखकर ही संस्थान के अनुसंधान कार्यक्रमों की रूपरेखा प्रस्तुत की गयी है । स्रोत संरक्षण और इंधन मत्स्यन क्षमता, अगाध समुद्री स्रोतों का शोषण, मात्स्यकी रद्दियों का उपयोग, मत्स्य एवं मात्स्यकी उत्पादों पर मूल्य संयोजन, मत्स्य के पैदावार एवं पशु पैदावार प्रौद्योगिकी पर इलक्ट्रॉनिक उपकरणों का विकास आदि प्रतिपादित प्रमुख क्षेत्र हैं ।

परिषद के नीति निर्णयानुसार संस्थान भा. कृ. अनु. प. द्वारा मंजूरीकृत एवं वित्तीकृत तदर्थ अनुसंधान प्रोजेक्टों के जरिए बाहरी वित्तीय सहायता प्राप्त किया जाता है। संस्थान के संरचना विकास के लिए निधि को जुटाने के उद्देश्य से निधि केन्द्रित योजनाएँ परिषद को प्रस्तुत की जाती हैं / परिषद द्वारा अनुमोदित किया जाता है। परिषद से आधारीय विशिष्ट मार्गनिर्देशों के आधार पर अभिरूचि रखनेवाले उद्यमियों को परामर्शिता कार्यक्रमों को प्रदान करना निधियों के पैदा करने का अन्य प्रमुख रास्ता है ।

हाल ही में, संस्थान ने खाद्य सुरक्षा समस्याओं की संगतता के लिए अधिक प्रभावकारी कार्यक्रम के रूप में एच ए सी सी पी (खतरा विश्लेषण संकट नियंत्रण बिन्दु) धारणा, संसाधक को सिखाना शुरू किया।

यह गर्व की बात है कि भारत सरकार ने संसाधन संयंत्र निरीक्षण, जल, बर्फ और कच्ची सामग्री प्रमाणन एवं आंतरिक प्रयोगशाला गुण संबंधी कार्यों को संस्थान पर सौंपा है । मुझे यह कहते हुए और भी खुशी का अनुभव हो रहा है कि युरोपियन संघ को निर्यात करने वाले समुद्री खाद्य प्लांटों को अंतिम अनुमोदन देनेवाले निरीक्षणत्मक लेखा परीक्षा दल (एस. ए. टी) में केवल के. मा. प्रौ. सं. के विशेषज्ञ ही है ।

17 वीं जुलाई 1997 में डॉ. आर. एस. परोदा, महा निदेशक ने संस्थान के एरिस सेल का उद्घाटन किया और उसी दिन महानिदेशक ने भा. कृ. अनु. प. के. मा. प्रौ. सं. अतिथि गृह का उद्घाटन भी किया।

संस्थान में संपन्न एक सरल समारोह में डॉ. के. गोपकुमार, उपमहानिदेशक (मा) ने 15.5 एम इंधन क्षमता के अगाध समुद्री मत्स्यन यान का, जो, भा. कृ. अनु. प. द्वारा वित्तीय सहायता प्राप्त परियोजना के भाग के रूप में तदर्थ योजना के अधीन विकसित संरचना के आधार पर निर्मित किया जा रहे है, कील लगाया ।

डॉ.के. गोपकुमार से, जिसकी उपमहानिदेशक (मा) भा. कृ. अनु. प. के रूप में 21 नवंबर, 1997 को पदोन्नति हुई है, कार्यकारी निदेशक के रूप में कार्य संभाले मुझे वर्ष 1997-98 की वार्षिक रिपोर्ट पहली बार प्रकाशित करने में बेहद खुशी है ।

(डॉ.के. रवीन्द्रन)
निदेशक

अनुसंधान विशिष्टताएँ मुख्यालय, कोचिन

मात्स्यकी प्रौद्योगिकी डिवीज़न

मुख्य उपलब्धियाँ

- अभिकल्पों के लिए संदूषण दर की पूर्व सूचना देने संबंधी दर घटकों के विशेष संदर्भ में एलुमिनियम, ताँबे एवं लोहे जैसे तीन प्रमुख समुद्री अभियांत्रिकी के संदूषण का गणितीय प्रतिरूपण विकसित किया गया ।
- समुद्री जल के संरचनात्मक प्रयोग के लिए आई एस 3039 के निकटस्थ एवजी के रूप में आई एस : 226 और आई एस : 2062 के समरूप इस्पात की गणना की जा सकती है ।
- मात्स्यन नावों के पोतखोलों पर परिदूषण जीवों की बढ़ती के परिणाम स्वरूप प्रोफाइल स्थूलता 8 महीनों में 36 एम एम निकाला गया है ।
- प्रयोगशाला में सी सी ए, क्रयोसेट आदि काठ संरक्षकों एवं द्वैत उपचार ने दिखाया कि ताँबे, अरसेनिक एवं क्रॉमियम नमक का निक्षालन वही क्रम में है ।
- मृदा शवधान परीक्षण में इन परिरक्षकों का तुलनात्मक मूल्यांकन ने दिखाया कि सी सी ए और द्वैत उपचार में तीन वर्षों के बाद भी कोई फफूँदे या दीमकों का आक्रमण नहीं हुआ है ।
- *डाईसिडा हेरबैका*, *क्लार्थिया फ्रोन्डीफेरा* और *कालीस्योन्जिया* जाति आदि स्पंजों से निचोड़े प्रति जैविक मूलकों, *हाइड्रोडेस एलगनस* नामक नली कृमि की झिल्लियों के उपनिवेशों को प्रतिरोधित करते हुए दिखाई थी ।
- 20 एम एम और 30 एम एम आकारों की तुलना पर 40 एम एम स्क्रायर मेश कोड एन्ड से मात्स्यों, किशोरों एवं झींगों के पश्च-झिल्ली रूप बाहर निकलते हुए दिखाई पडा ।
- 28 एम और एम टी 8 पी अर्ध वेलापवर्ती ट्रॉल का आदिप्ररूप मूल्यांकन, 14 की. ग्रा. सी पी यू ई के साथ अपतलीय स्रोतों के शोषण के लिए प्रभावकारी दिखाया गया ।
- 20 एम दिगुने लगामों से युक्त 18 मी 8 पी अर्ध वेलापवर्ती ट्रॉल के साथ 1350 x 1000 एम एम उन्नत पहलु दर के सूपर ऊद नाव लक्ष्य जातियों ने पकडाव में क्षमता दिखायी।
- आई सी ई एस दबाव गेज को अक्सर प्रयुक्त करके मापित करने पर कोड एन्ड मेश आकार ने, कोई दीर्घीकरण को नहीं दिखाया ।
- नियंत्रण जाल की तुलना में बी आर डी (पकड लघूकरण उपकरण) जोडे ट्रॉल जाल ने झींगा पकड में कोई लघूकरण को न दिखाया ।
- कोड एन्ड वरणात्मक अध्ययनों ने दिखाया कि पकड स्टेक जालों पर मेटापीनेस डोबसोनी प्रमुख था।
- पी ई और नाइलॉन जाल से युक्त अगाध समुद्र क्लोम-जालीकरण, नाइलॉन जालों की अपेक्षा अधिक पकडाव को उतारते हुए दिखाई पडा ।

मत्स्य संसाधन डिवीज़न

मुख्य उपलब्धियाँ

- हिमीकृत आई क्यू एफ झींगों को पूर्ण रूप में या सिरहीन रूप में तैयारित करने की प्रक्रिया को मानकीकृत किया गया ।
- संवर्द्धित पीनेस मॉनोडॉन से बटरफ्लाई, पकाए, छिलकित एवं सिराहीन और पकाए राउन्ड टेल-ऑन रूपों में बैटर व ब्रेड किए गए उत्पन्नों की तैयारी और हिमीकृत संग्रहण के लिए उनके संवेष्टन एवं हिमीकरण केलिए प्रक्रियाओं को मानकीकृत किया गया ।
- अगाध समुद्री कलवा (एपिनेफेलस जाति) से, लेपित उत्पन्नों की तैयारी केलिए प्रक्रिया को मानकीकृत किया गया।
- खेती किए गए कतला कतला से तैयारित धुमित एवं डिब्बाबन्धित उत्पन्नों के रंग एवं गठन के सुधार की तरीका को विकसित किया गया ।
- शार्क से संसाधित एवं शुष्कित उत्पन्नों की तैयारी की तरीका भी विकसित किया गया ।
- आलबिनो मूषिकों पर चलाए गए भोजन परीक्षण ने कैटोसन की बढ़ती मंदित करने के प्रभाव को सूचित किया गया। कैटोसन-जेलाटीन घोल से समान मोटाई के पारदर्शक फिल्मों की तैयारी की गयी ।
- एक ही स्थिति में पूरे शुष्कित स्किवल्ला, विप्रोटिनीकृत एवं शुष्कित स्किवल्ला की अपेक्षा अधिक विस्कासिता के कैटोसन दिया गया है ।
- ऐल्कलेसों को प्रयुक्त करके जलापघटन द्वारा झींगे सीपी से अस्सी प्रतिशत प्रोटीन लिया गया था ।
- स्प्रे शुष्कित कर्कट सीपी निचोडों को प्रयुक्त करके शोरबा के लिए एक नुस्खा तैयार किया । वाणीज्यिक तौर पर उपलब्ध प्रचलित ब्रान्डों की तुलना में यह उत्पन्न पौष्टिक मूल्य एवं सुवास में श्रेष्ठ पाया गया है ।
- 30 प्रोटीन से युक्त बनाए गए आहारों को खिलाए गए आम शफरी, मिगल एवं रोहू 20 और 25 प्रोटीन युक्त आहार को खिलाए गए की अपेक्षा अधिकतम बढ़ती दर प्रकट किया ।
- कर्कट मांस से करियों एवं चटनी चूर्णों की तैयारी केलिए तरीकाओं को मानकीकृत किया गया ।
- जिन्दा कर्कटों के परिवहन केलिए रूई, लकड़ी छीलन या नारियल जटा फाइबर की अपेक्षा सिट्रिक अम्ल के साथ मिश्रित आद्र बुरादें श्रेष्ठ संवेष्टन सामग्री दिखाई पडी ।
- 12 मैक्राण पी ई एस टी में संवेष्टित 150 जी सी डी पी ई निर्वात संवेष्टित एवं काचन के बाद वायु संसाधित एवं कवचित आई क्यू एफ पीनेस मोनोडॉन यद्यपि वायु एवं काच में संवेष्टित, थोडी सी मात्रा में निर्जलीकरण दिखाने पर भी, 90 दिनों के संग्रहण के बाद इन्द्रियग्राही रूप में श्रेष्ठ माना गया है । काच एवं निर्वात के बिना वायु में जिसको संवेष्टित किया गया है, निम्न इन्द्रियग्राही विशेषताओं एवं उन्नत निर्जलीकरण के कारण तिरस्कृत किया गया है ।
- 12 मैक्राण पी ई एस टी/150 जी एल डी पी ई में निर्वात में संवेष्टित शुष्कित बैराकुडा, वायु में संवेष्टित की तुलना में, उपवेशी तापमान में 120 दिनों के संग्रहण, के बाद भी अच्छी इन्द्रियग्राही गुणता को दिखाया।

जैव रसायन व पोषण डिवीज़न

मुख्य उपलब्धियाँ

- पूर्वों तट से पकड़े गए मत्स्य में ऑर्गेनोक्लोरिन अधिकांश मामलों पर संकट स्तरों से नीचे था । हेक्सावलोरो-साइक्लो हेक्साइन (बी एच सी) प्रमुख पीडकनाशी दिखाई पडा ।
- विश्लेषित सभी मत्स्य नमूनों में विषैले पदार्थों का अंश संकट स्तर से नीचे था । विश्लेषित नमूनों में सेलेनियम, एक सूक्ष्म पौष्टिक पदार्थ, प्रति मिलियन स्तर में 0.2 से 0.4 भाग उपस्थित था ।
- वाणीज्यिक मत्स्य तेलों से पॉली असंतृप्त वसा अम्लों को मुक्त रूप में और एथिल एस्टरों के रूप में वियुक्त एवं सांद्रित किया गया । इन सांद्रणों में डोकोसा हेक्सोनोइक अम्ल और एकोसा पेन्टानोइक अम्ल दोनों इकट्ठे होकर कुल पी एम ए के 80% आया था ।
- वाणीज्यिक मत्स्य तेल से तैयारित पी यू एफ ए सांद्रण, 3 महीनों तक आहार खिलाए गए चूहों के सीरम कोलेस्ट्रॉल स्तर को मूल स्तर का एक तिहाई तक निम्न कर दिया ।
- विभिन्न ताजे जल फार्मों से लिए गए मत्स्य की मत्स्य तेलों के वसा अम्ल संरचना समान जातियों में ज्यादा परिवर्तन नहीं दिखाता है ।
- मत्स्य और सीपी मत्स्य के बत्तीस जातियों के कोलेस्ट्रॉल अंश निश्चित किया गया । अधिकांश मत्स्यों में प्रति 100 ग्रा. ऊतक में कोलेस्ट्रॉल स्तर 45-70 मि. ग्रा. दिखाई पडा।
- वाँगडा पेशी से निम्न आयनिक बफरों द्वारा स्वलयन क्रियाशीलता निचोडा जा सकता है लेकिन इसका पर्याप्त भाग पेशी के संरचनात्मक प्रोटीन से सशक्त रूप में परिबद्ध है ।
- मुगिल सेफालस और चानोस चानोस के जिगर भाग में फैटिनेस क्रियाशीलता अच्छे स्तर में मौजूद है ।
- चानोस चानोस के त्वचा एवं पेशी से आंशिक रूप में शोधित कैलोजन को तैयार किया गया और अमिनो अम्ल संरचना एवं वैद्युत कण संचालन आचार के विशेषता विश्लेषण किया गया ।
- तैयारित संयुक्त कैलोजन कैटोसन फिल्म चूहों पर कोई बुरे प्रभाव पैदा न किए बिना, मेडिकल कॉलेज, कैलिकट, केरल में भयंकर ज्वलन मामलों पर कृत्रिम त्वचा के रूप में अब मनुष्य स्वयं सेवकों पर मूल्यांकन परीक्षण केलिए प्रयुक्त कर रहा है ।
- पीनेस मोनोडॉन प्रोटीन के जल विलेयक एवं नमक विलेयक अंश के पायस बनने की क्रियाशीलता हिमसंग्रहण के दौरान घटाया जाता है, घटती, मुख्यतः नमक विलेयक अंश में अधिक होती है ।

गुणता आश्वासन और प्रबंध डिवीज़न

मुख्य उपलब्धियाँ

- निर्यात के लिए रखे गए मत्स्य/सीपी मत्स्य उत्पन्नों के करीब 200 नमूनें, सालमोनेल्ला, विब्रियो, कॉलेरा, लिस्टीरिया मॉनोसाइटोजेन्स एवं स्टाफिलोकोकी आन्वविषों से मुक्त दिखाई पडा ।
- आलप्पी जिला से संचित संसाधन जल नमूनों ने प्रोटीन, नाइट्रोजन, फेनोलिक संयुक्तों फोस्फेरस, अलुमिनियम और लोड की उपस्थिति को सूचित करता है और इ इ सी इकाईयों के अनुसार प्रमाणन के लिए उपचार को अवश्यक बना देता है ।
- मत्स्याण्ड नमूनों में पेशी की अपेक्षा उन्नत धात्विक अवशेष होता है यद्यपि सुरक्षा स्तर पर ।
- बर्फ में 3% सोडियम क्लोराइड का समावेशन, बाजारी ताजे मत्स्य की शेल्फ जीविका को 7 से 10 दिनों तक बढ़ाया जाता है ।
- अच्छी गुणता के बाँगडे का, के मूल्य 45-55 रेंज में दिखाई पडा ।

अभियांत्रिकी डिवीज़न

मुख्य उपलब्धियाँ

- खुले किस्म प्रोपेल्लरों की तुलना में सुधरे चंचु प्रोपेल्लर में 20 इंधन क्षमता प्राप्त हुई थी ।
- के.मा.प्रौ.सं. अभिकल्प के 15.5 एम इंधन प्रभावकारी इस्पात मत्स्यन यान की संरचना प्रारंभित की गयी।
- 18 एम इंधन प्रभावकारी अगाध समुद्री ट्रॉलर और गिल नेटर व लाँग लाइनर के आधारीय पैरामीटरों एवं सामान्य प्रबंध को अंतिम रूप दिया गया ।
- 20 गांठ तक रेंज के उन्नत गति लाँग के विकास की पूर्ती की गयी ।
- एक सुदूर नियंत्रित बहु-चैनलीय मिट्टी आर्द्रता मीटर की तैयारी की और भुगतान के आधार पर सी. आई.ए.ई. भोपाल को वितरित किया गया ।
- थेल्ली चेम्मीन (मेटापीनेस डॉबसॉनी) और जवाला झींगा (असेटस-स्पी) के लिए 12 की. ग्रा. क्षमता के सतत प्रवाही तिर्यक परिचालन टाइप यांत्रिक गरम वात शुष्कक का आदि-प्ररूप परीक्षणात्मक नमूने की अभिकल्पना की गयी ।
- कम दाम के छोटे झींगों के माँस को प्रयुक्त करके मूल्यवान जंबों झींगा उत्पादन के लिए यांत्रिक व्यवस्था अभिकल्प को विकसित किया गया ।
- थेल्ली चेम्मीन और जवाला झींगा के स्वास्थ्य निर्जलीकरण के लिए 10 की. ग्रा. क्षमता के सस्ता चेंबर टाइप पी वी सी सूर्य शुष्कक को भी विकसित किया गया ।

विस्तार, सूचना एवं सांख्यिकी डिवीज़न

मुख्य उपलब्धियाँ

- मत्स्य संसाधन संयंत्रों, शीतगारों, बर्फ निर्माण संयंत्र एवं छिल्कायन शेडों की संख्या एवं व्यवस्थापित क्षमता पर संचालित सर्वेक्षण ने दिखाया कि गुजरात में ही संयंत्र अनुपात क्षमता उन्नत है बाद में महाराष्ट्र और केरला छठवीं स्थान पर आया है ।
- चेन्नैनम मत्स्यन स्थान पर नाईलॉन मोनो फिल्मेन्ट क्लोम जालों पर हुए विनिर्देशनों ने साबित किया कि 36 एम एम क्लोम जाल की अपेक्षा 50 एम एम क्लोम जाल उन्नत मत्स्य पकडाव देता है।
- तीन मत्स्यन केन्द्रों में यंत्रीकृत मत्स्यन नाव स्वामियों द्वारा सूधरे प्रौद्योगिकीय प्रथाओं के अभिग्रहण का औसत सीमा 53.5 से 60 तक भिन्न थी । मत्स्यन नाव की औसत वार्षिक उत्पादकता वेरावल और पोरबन्दर प्रदेशों की अपेक्षा उन्नत दिखाई पडा ।
- दो मत्स्यन केन्द्रों पर एफ आर पी क्राफ्टों को संचालित कारीगर मछुवारों के औसत मत्स्य पकड प्रति मत्स्यन दिवस पर 195.95 की. ग्रा. और 47.48 की. ग्रा. मान निकाला है ।
- झोंगा छिल्कायन शेड स्वामियों के बीच, प्रशिक्षण अधिक क्षेत्रों पर आवश्यक महसूस हुआ था । जैसा कि कच्ची सामग्रियों के पश्च पैदावार हस्तन, प्रयुक्त जल या बर्फ की गुणता, सफाई सूची एवं स्वास्थ्य या सफाई का प्रबंध पहलुएँ आदि ।
- समूह विशेषताओं के संबंध में, चेन्नैनम मछुवारे सोसाइटी के प्रतिवादियों में अन्य दो गाँवों के समूहों की अपेक्षा उन्नत औसत समूह विशेषता घातांक (71.5%) दिखाई पडा । किसी भी अन्य केन्द्रों के प्रतिवादियों के समूह विशेषता अवबोधन में वार्षिक आय कोई प्रभाव नहीं डाला ।

सूक्ष्म जीव विज्ञान, किण्वन एवं जैव प्रौद्योगिकी अनुभाग

मुख्य उपलब्धियाँ

- एरणाकुलम जिला के चेन्नैनम से संचयित खेती किए गए झोंगों के दस नमूनों में से दो में क्लोस्ट्रिडियम बाटुलिनम दिखाई पडा । संवर्द्धक सी. बाटुलिनम टाइप सी और डी पहचाना गया ।
- बारह लाक्टिक अम्ल जीवाणवीय संवर्द्धनों में से चार संवर्द्धनों द्वारा उत्पादित बाक्टीरियोसिन लिस्टीरिया जाति जिनमें लिस्टीरिया मॉनोसईटोजीनस के विरुद्ध सक्रिय दिखाई पडा ।
- वी. पैराहेमोलिटिकस, वी आलजिनोलिटिकस, वी. मिमिकस, वी. वलनिफिकस और वी. हारवेयी आदि रोगजनक विन्नियों के पाँच समुद्री जातियों के अनुकूलतम बढ़ती तापमान 37° सी दिखाई पडा ।

वेरावल अनुसंधान केन्द्र

मुख्य उपलब्धियाँ

- गुजरात तट के देशज मत्स्यन गियर की वर्तमान स्थिति संबंधी अध्ययन ने दिखाया कि इस क्षेत्र पर प्रयुक्त प्रमुख देशी गियर था क्लोम जाल, डोल जाल एवं स्टेक जाल ।
- वेरावल में लोकप्रियता के लिए 20 एम दो सीवन बडे मेश स्फुटनिक ट्रॉल को प्रारंभित किया गया ।
- वेरावल में सभी काष्ठ डोंगियों के स्थान पर एक आर पी डोंगियों को प्रयोग में लाया गया है ।
- हिमीकृत पूरे रिबन मत्स्य, स्टीक और फिलेटों के उत्पादन के लिए एच ए सी सी पी योजना को मानकीकृत किया गया ।
- डोमा के जीवाण्वीय फ्लोरा में ऐरिल सल्फेट उत्पादक प्रमुख था जब कि स्क्रिक्वड एवं कतला मत्स्य में प्रोटियस स्पी. और स्यूडोमोनास स्पी. प्रमुख था ।
- मनुष्य उपभोग के लिए जवाला, असेटस स्पी. के उन्नयन के लिए प्रौद्योगिकी को मानकीकृत किया गया ।
- वेरावल में ताजे अवतारित मत्स्य में विब्रियो स्पी के संदूषण स्रोत को पहचान किया गया ।

विशाखपटनम अनुसंधान केन्द्र

मुख्य उपलब्धियाँ

- सिल्वर बेल्लियों एवं रिबन मत्स्य के पकडाव के लिए 30 एम मत्स्य ट्रॉल एवं 25 एम रस्सी टॉल सतत प्रभावकारी रहा ।
- विशाखपटनम तट से संचयित नमकीकृत एवं शुष्कित मत्स्य को, फफूँदे कीडाणुबाधा की जाँच के लिए विश्लेषित किया गया। वियुक्त फफूँदों के रूप में ऐस्पेरजिलस फ्लेक्स, ए. निगर, पेन्सिलियम स्पी. एवं मूकर स्पी को पहचान किया गया ।
- आंध्र प्रदेश में विपणन किए गए झींगे आहार नमूनों में, पिछले वर्षों की तुलना में इस वर्ष में बहुत कम मिट्टी दिखाई पड़ी, यह गुणता सुधार में एक सुनिश्चित प्रवृत्ति को सूचित करता है ।

बुरला अनुसंधान केन्द्र

मुख्य उपलब्धियाँ

- आर. क्रसिया और तिलपिया मोसांबिका आदि जीवित छोटे आकार की ताजे जल मछलियों में 60°C और 80°C के बीच शीत आघात प्रयुक्त कूड शीत निष्क्रिय किया जा सकता है ।

(केन्द्र होशंगाबाद की ओर जाने की तैयारी में होने के कारण वर्ष का अधिकांश अनुसंधान कार्य को स्थगित रखा गया है)

कैलिकट अनुसंधान केन्द्र

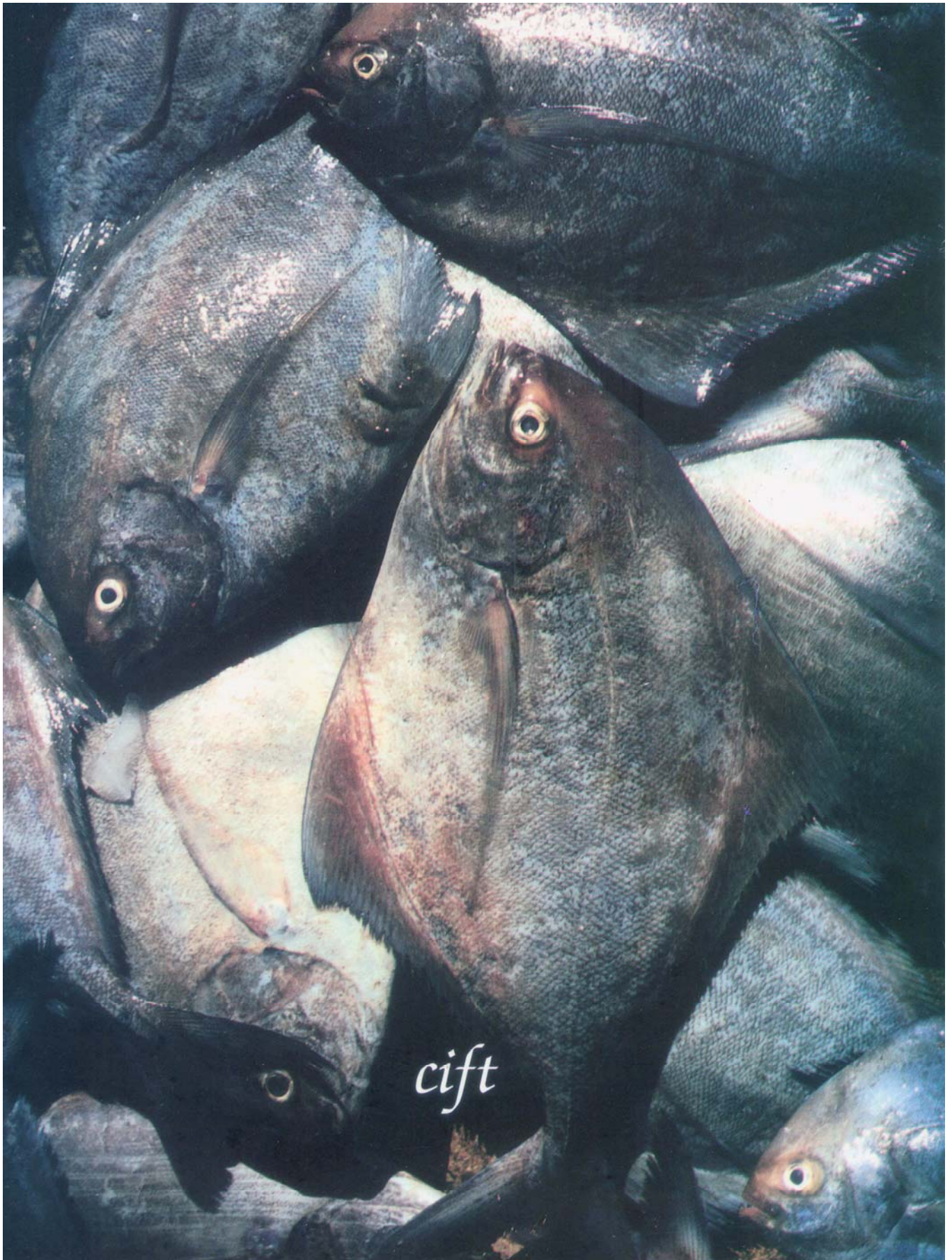
मुख्य उपलब्धियाँ

- ताजे रिबन मत्स्य से, भुनने के लिए तैयार, शुष्कित फिलेटों की तैयारी की गयी । सोल एवं आँकवियों से भी भुनने के लिए तैयार फिलेटों की तैयारी की गयी ।
- अन्य शुष्कित मत्स्य से भिन्न मासमिन में राईसोपस जाति के अधिकांश फफूँदे मौजूद है ।
- केरल के बाहर से कालिकट लाए गए शुष्कित मत्स्य में पाए गए सूक्ष्म वनस्पतीजात के मुख्य घटक ऐस्पेरजिलस जाति ही रहे ।

मुम्बई अनुसंधान केन्द्र

मुख्य उपलब्धियाँ

- पूने मत्स्य बाजारों में समुद्री एवं ताजे जल मत्स्यों को मुम्बई, रत्नगिरी एवं गोवा से बाँस टोकरियों में सडक पर परिवहित किया जाता है ।
- नयी मुम्बई बाजारों में बिके गए गोल एवं रावा आदि मत्स्यों के गुणता मत्स्य विखंड, अन्य प्रकार के उत्पन्नो से श्रेष्ठ दिखाई पडा ।



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