



मत्स्य प्रौद्योगिकी समाचार Fish Technology Newsletter

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News from the Research Front

Quality Evaluation of Fish Meal Prepared from Myctophid Species (*Benthosema fibulatum*) Caught from the Arabian Sea

Globally, fish provides about 17 percent of the population's average per capita intake of animal protein. In 2010, capture fisheries and aquaculture supplied the world with 148 million tonnes of fish, crustaceans and molluscs. Of this, 128 million tonnes was used as human food, providing an estimated per capita food supply of about 19 kg (live weight equivalent), (FAO Statistical Year Book, 2013). Most of the fish landed and not used for direct human consumption is processed into fish meal and oil for use as animal feed, not only for carnivorous aquatic species such as shrimp, salmon, trout, eels, sea bass and sea bream, but also for pigs, chickens, household pets, cattle, etc.

Several studies reported that myctophids are potential resource for production of various commercial fishery products such as fish meal, fish oil, fish silage and surimi and some other products like lubricating oil, cosmetics and wax (Nair *et al.*, 1983;

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Benthosema fibulatum

केन्द्रीय मत्स्यकी प्रौद्योगिकी संस्थान

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Noguchi, 2004; Olsen *et al.*, 2010). Myctophids are distributed throughout the world oceans. However, the largest concentration is reported in the Indian Ocean, particularly in the northern Arabian Sea including the Gulf of Aden, the Gulf of Oman and the coast of Pakistan (Gjosæter, 1984). These fishes are generally small, ranging in size from 3 to 30cm, with blunt heads, large eyes, laterally compressed body with small silvery rounded scales and rows of light producing photophores on the body and head to signal one another, attract mates, or to attract or detect prey. Myctophids are known to be an important prey for various marine animals and their lipids, which are reported to contain high amounts of wax ester, and are an important energy source for their predators (Tyler and Percy, 1975).

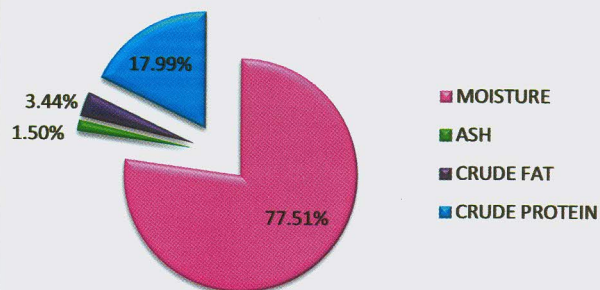
The proximate composition of fish meal processed from myctophid species *B. fibulatum* and development of feed using the prepared fish meal was evaluated. The myctophid samples collected during October 2013 from the catch of FORV Sagar Sampada cruise along 11°16.963 – 11°09.974 N latitude and 72°53.715 – 72°58.629 E longitude at a depth range of 223 - 1860m, stored at -18 °C and brought to the laboratory. The average length (63 ± 3mm, SL) and weight (1.308 ± 0.14 g) of the samples were noted.

The proximate analysis of the samples was carried out as per standard methods (AOAC, 2000). For the analysis of fatty acid components the fat was saponified and transesterified yielding fatty acid methyl esters (FAME). Gas chromatograph (Varian Star #1) equipped with a Flame Ionisation Detector (FID) was used for analysis of the fatty acids and compared with fatty acid methyl ester standards (Supelco FAME 37 standard).

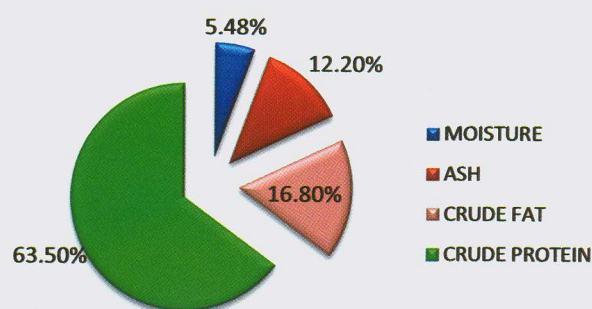
The moisture content, ash content, crude fat and crude protein of *B. fibulatum* was 77.51%, 1.50%, 3.44% and 17.99% respectively. The fish meal was processed by wet rendering method and the proximate composition of fish meal revealed 5.48% moisture, 12.20% ash, 16.80% crude fat and 63.50% crude protein, respectively. The fish oil is effectively a by-product that proves to be a rich source of energy and fatty acids. Fatty acid profile of fish oil showed that this species have a higher Saturated Fatty Acid (SFA) content. The fatty acid composition of *B. fibulatum* consists 46.34% of SFA, 23.59% of mono unsaturated fatty acid (MUFA) and 29.89% poly unsaturated fatty acid (PUFA). Among the saturated fatty acids, palmitic acid was present in higher level (30%). In the mono unsaturated fatty acids, oleic acid (cis) and elaidic acid (trans) were the prominent one (14%). In poly unsaturated fatty acids, Docosahexanoic acid (DHA) content was higher (16.13%). Higher protein

and fat content in the fish meal and fish oil of this species could well be a potential source of alternative protein and fat for the fish and animal feed.

Proximate composition of *B. fibulatum*



Proximate composition of fish meal

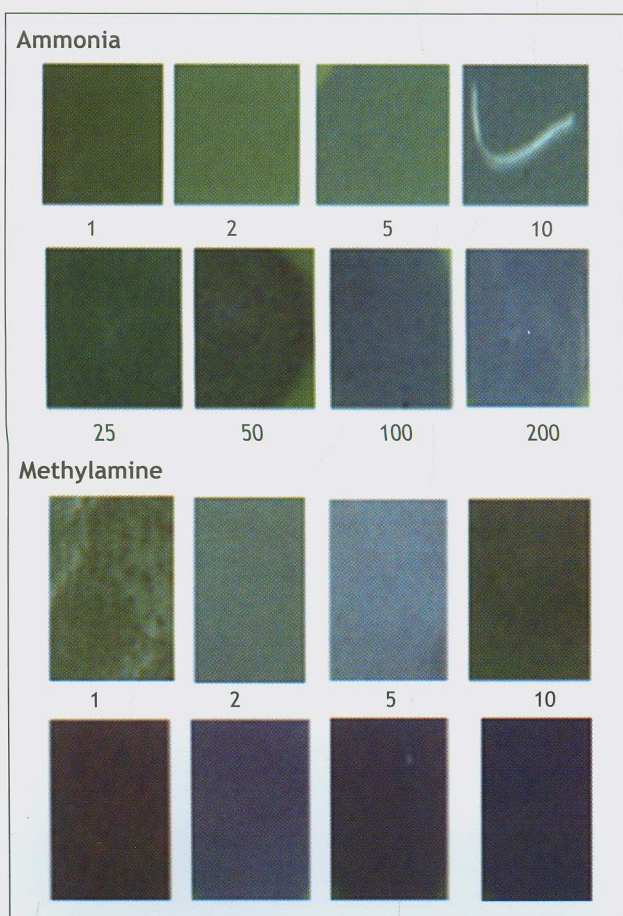


Among commonly used feed ingredients, fish meal is considered to be the best ingredient, due to its compatibility with the protein requirement of fish (Alam *et al.*, 1996). While formulating the feed one must take into account some considerations such as price, availability of ingredients used, anti-nutritional factors and palatability of mixtures



Fish feed prepared from fish meal

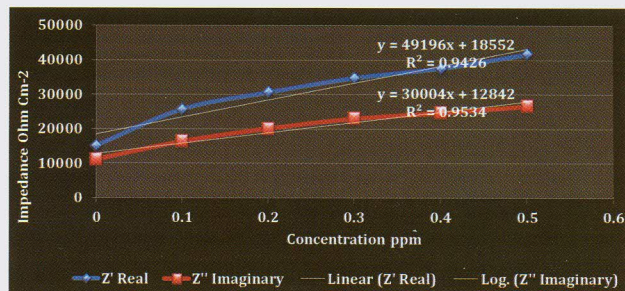
cobalt. The wave numbers at 488 and 543 cm^{-1} highlights the presence of copper and cobalt, whereas 945, 1249, 1011, 1510, 1650 cm^{-1} are due to the presence of curcumin. The characteristic peaks of polyaniline was 660, 829, 1180, 1290 and 1560 cm^{-1} . There was clear shift in the peaks of designated individual molecules showing the formation of composite. The composite was tested for the detection of ammonia, methyl, dimethyl and trimethyl amines (TVBN). TVBN detection was done through cyclic voltammetry, electrochemical impedance and visual methods. The composite responded TVBN from 1ppm to 200ppm by exhibiting gradation of bluish green colours with increasing concentration. The nitrogen and amine molecules responded in comparatively similar pattern. The colouring intensity increased with increasing concentrations.



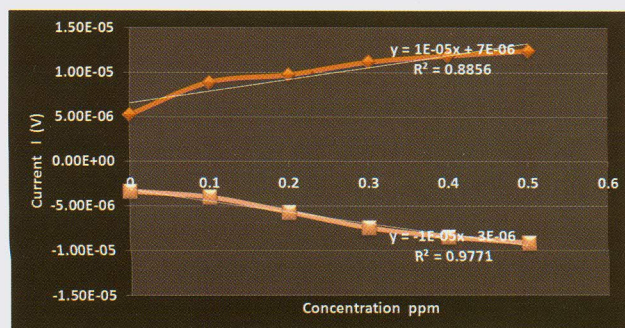
Response of polyaniline composite with different concentrations (1 to 200ppm) of ammonia and methyl amine

Detection of very low concentration of TVBN can be carried out through cyclic voltammetric and impedance techniques. The composite were embedded over polished glassy carbon electrode and then dried. The ammonia and the amines were added into 1:1 solutions of potassium ferro and ferricyanide electrolyte and the analyte was detected

electrochemically by using Pt as counter, glassy carbon electrode as working electrode and Ag/AgCl electrode as reference electrode. The Figure below shows the cyclic voltammetric pattern of methylamine in different concentrations and other amines also exhibited similar patterns. Ammonia is not responded with cyclic voltammetry since it will not undergo any oxidation and reduction reaction.



Electrochemical impedance spectral response of different concentrations ammonia. The graph shows the impedance of real (Z') and imaginary (Z'') with different concentrations, which followed linear relationships



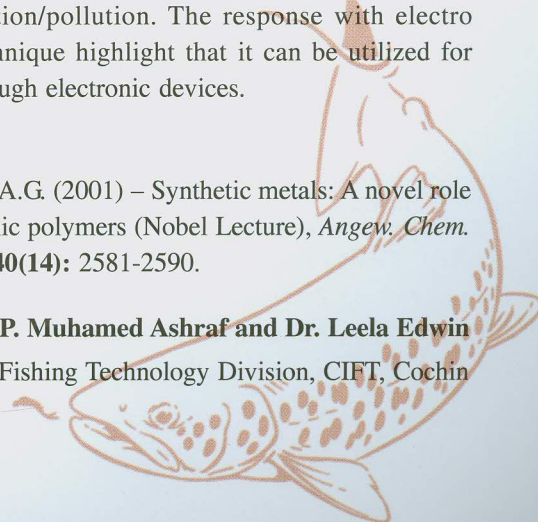
Cyclic voltammogram of methylamine in different concentrations and the bottom is the peak current response at different concentrations. Upper line shows the oxidation response and the bottom due to the reduction.

The results showed that the synthesized composite is a potential candidate for the detection of ammonia, methyl, dimethyl and trimethyl amines and the method can be utilized for the detection and quantification of fish spoilage and adulteration/pollution. The response with electro chemical technique highlight that it can be utilized for detection through electronic devices.

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Cost and Earnings Analysis of Dolnet Operated in Karanja Taluk, Raigad District, Maharashtra State

In India, small scale fisheries contributed 81 per cent to the fisheries sector (Kathiah, 2008). According to FAO (1999), small scale fisheries/traditional fisheries is defined as 'fishing households using relatively small amount of capital and energy, relatively small fishing vessels, making short fishing trips, close to shore, and mainly for local consumption'. Dolnets are the fixed bagnets which are used indigenously in two states of the country, Maharashtra and Gujarat exclusively along the north-west coast of India (Mane and Sundaram, 2011). In Maharashtra, it is one of the prominent gears used by the fishermen which are popularly known as 'Bokshi' in local language. The species caught by the dolnet include Bombay duck, catfishes, croackers, ribbon fishes, pomfrets, lobsters, prawns etc. and the major targeted species by the gear are prawns and Bombay duck in Maharashtra and Gujarat respectively (Manojkumar and Dineshbabu, 1999). The economics of dolnet fishing operation in Maharashtra were worked out as part of a larger study.

Motorized fishermen use wooden craft with length varying from 6.1 to 8.22 m. They use two to five nets of 50 – 60 kg per net.



Wooden craft used by the dolnetters in Karanja taluk, Maharashtra

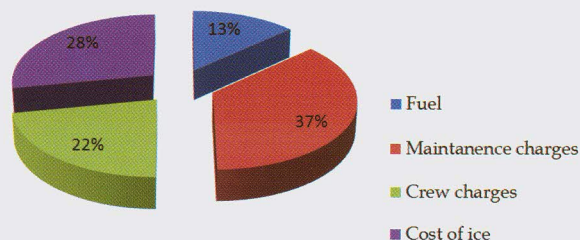
The cost and earnings of dolnet operating fishermen of 20 respondents is given in the Table below. The total fixed cost comprises of costs of craft, gear and engine in which more than 80 per cent is on investment on craft alone. Total variable cost includes data on fuel, repair and maintenance, charges on crew and ice. Major share of variable cost is on repair and maintenance (37%) due to their practice of operating craft, gear and engine beyond

their productive life period without replacement. Fuel cost is comparatively low (13%) among the variable costs as their fishing grounds are near to shore. Raje and Singh (1995) observed that the major problem faced by the dolnetters was the high maintenance cost which varied from ₹ 4000 – 5000 per net.

Economics of dolnet (motorized) fishing operation in Maharashtra (Per annum)

Particulars	Amount (₹)
Total Fixed Cost (A)	36750.00
Total Variable Cost (B)	54500.00
Total Cost (A+B)	91250.00
Gross Income (C)	150000.00
Net Income	58750.00

Variable cost of dolnet fishing operation



The total cost of operation estimated for the dolnet fishing was ₹ 91250/- per year. The average net income was ₹ 58750/- per year. It is concluded that in spite of profitability, dolnet fishers are incurring high variable cost under repair and maintenance due to their use of craft, gear and engine for too longer period beyond the productive life. This is also combined with their lack of knowledge and ability to replace/upgrade the fishing inputs in time. It is suggested that the dolnet fishers should provide high priority to increase their awareness and adoption of new technologies so as to maximize their profit.

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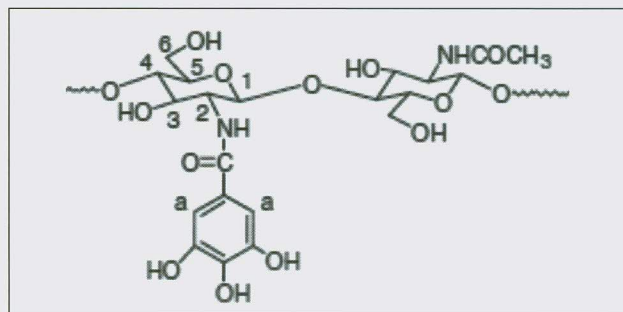
Phenolic Acid Functionalized Chitosan: Antioxidant Biomaterial for Food Sector

Chitosan, a natural polysaccharide has drawn wide
attention of researchers in food and pharmaceutical sector
because of its excellent biocompatibility. It is also claimed
that chitosan possess various bioactivities like antibacterial,
antifungal, antitumor, antioxidant etc. However based on
the source, molecular weight and degree of acetylation,
chitosan shows variability to limited bioactivity. Therefore
chemical and enzymatic modification of chitosan has been
tried to improve or modulate its bioactivity (Zohuriaan-
Mehr, 2005). In food sector there is a huge demand for
natural and biocompatible antioxidant materials for
preservation of food, as well as value addition of food.

Phenolic acids are natural antioxidants associated with
various health-promoting bioactivities. Phenolic acid
grafted chitosan is a new class of novel antioxidant
biomaterial with potential application in food sector. Gallic
acid, Caffeic acid, Ferulic acid grafted chitosan derivatives
has been reported in literature (Rena *et al.*, 2013). We
optimized a simple synthesis protocol for four phenolic acid
grafted chitosan derivatives, namely Gallic acid grafted
chitosan, Coumaric acid grafted chitosan, Ferulic acid
grafted chitosan and Vanillic acid grafted chitosan.
Antioxidant activity of these derivatives was compared.

A RedOx pair reagent, hydrogen peroxide containing
ascorbic acid was used for grafting chitosan with the phenolic
acids. Spectrophotometric and FTIR analysis of the derivatives
confirmed the success of synthesis. Antioxidant activity of
these derivatives was evaluated by DPPH assay. Ferulic acid

grafted chitosan showed best antioxidant activity (0.199 µg/
mL) followed by Vanillic acid grafted chitosan (0.462 µg/
mL), Gallic acid grafted chitosan (0.532 µg/mL) and
Coumaric acid grafted chitosan (0.536 µg/mL). Antimicrobial
activity of these derivatives is being investigated.



Structure of Gallic acid grafted chitosan

These derivatives have potential application in
microencapsulation of oxidation-sensitive active ingredients
like fish oil, vitamins etc. It can also be used in formulating
functional food and nutraceuticals. Its application as coating
material of raw and processed fisheries products for
enhancing shelf life needs to be evaluated.

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Draft Genome Sequence of a Nitrogen-Fixing Bacterium *Mangrovibacter* spp. MFB070 Isolated from an Aquaculture Farm

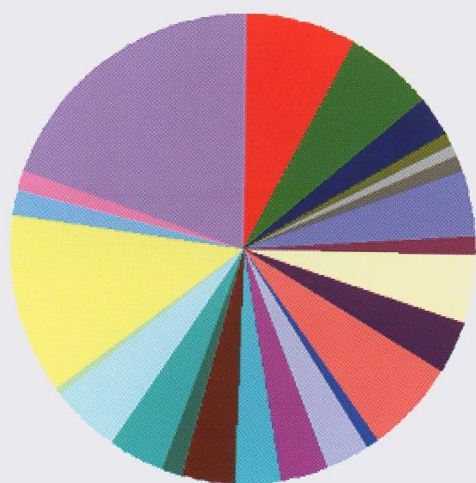
Mangrove ecosystem is a bridge between terrestrial
and marine ecosystem and harbours unique microbial

diversity and is expected to contribute towards improving
plant microbe interactions. *Mangrovibacter* spp. is a





Subsystem Category Distribution in *Mangrovibacter* spp. MFB070



- Cofactors, Vitamins, Prosthetic Groups, Pigments (294)
- Cell Wall and Capsule (224)
- Virulence, Disease and Defense (100)
- Potassium metabolism (30)
- Miscellaneous (35)
- Phages, Prophages, Transposable elements, Plasmids (35)
- Membrane Transport (167)
- Iron acquisition and metabolism (50)
- RNA Metabolism (178)
- Nucleosides and Nucleotides (132)
- Protein Metabolism (235)
- Cell Division and Cell Cycle (34)
- Motility and Chemotaxis (112)
- Regulation and Cell signaling (124)
- Secondary Metabolism (5)
- DNA Metabolism (118)
- Regulons (6)
- Fatty Acids, Lipids, and Isoprenoids (135)
- Nitrogen Metabolism (48)
- Dormancy and Sporulation (3)
- Respiration (146)
- Stress Response (176)
- Metabolism of Aromatic Compounds (16)
- Amino Acids and Derivatives (466)
- Sulfur Metabolism (63)
- Phosphorus Metabolism (45)
- Carbohydrates (713)

facultatively anaerobic, nitrogen-fixing bacterium representing a novel genus associated with the rhizosphere of mangrove-associated plants and belongs to the family Enterobacteriaceae. Only one species, *Mangrovibacter plantisponsor* having potential plant-beneficial properties was described (Rameshkumar *et al.*, 2010). To better understand the ability of *Mangrovibacter* spp. MFB070 strains to fix nitrogen, sequencing was performed on the Illumina MiSeq platform with a 2 × 250 paired-end run. 495,258 paired sequences were generated, for a total of >203.06 Megabases and a mean length of 205 bases per read. Reads were analyzed and quality checked using FastQC and *de novo* assembled using Velvet, resulting in 58 contigs, the largest of which is 650,185 bp; N50 of 240,741 bp.

The genome sequence was annotated using NCBI

GenBank and RAST genome annotation servers. The draft genome sequence of *Mangrovibacter* spp. is 5,361,682 bp, with a G+C content of ~64.8% and 5297 predicted coding sequences, and 36 tRNA genes for all of the amino acids. Set of genes involved in nitrogen metabolism were found in the genome. The organism encodes for *mdtABCD*, the multidrug resistance gene cluster that increase resistance to Novobiocin and Deoxycholate. The bacteria also encodes for genes for resistance to heavy metal cobalt, cadmium, zinc, arsenic and copper based on metal resistance determinants that contain genes for RND (resistance, nodulation, and cell division protein family) protein. Several phage proteins were also identified indicating the presence of phages in the bacteria. Genes involved in iron acquisition and metabolism including siderophores was also identified in the bacteria indicating the presence of phages in the bacteria.

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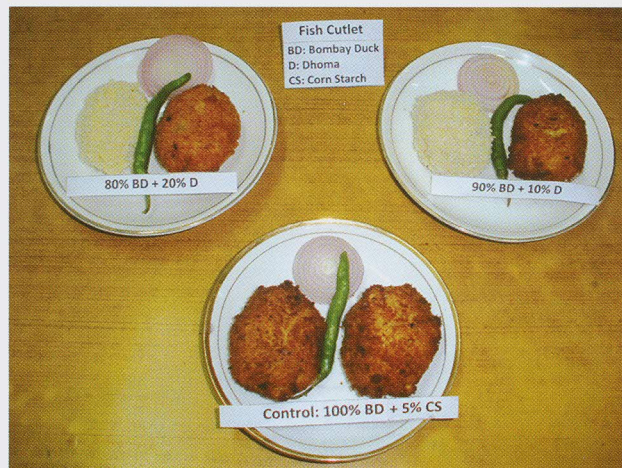
Microbiology, Fermentation and Biotechnology Division, CIFT, Cochin

Moisture Conditioning of Bombay Duck Meat for Product Development

Bombay duck (*Harpodon nehereus*) is an abundant marine species in North West coast of India. Traditionally, the demand of fresh fish is limited and major portion of

landings are converted to rope dried product. The unusually high moisture content which may go up to 90% coupled with high enzymatic activity makes it highly susceptible





Mince based products from Bombay duck mince after moisture conditioning

for microbial degradation. Moreover, heaps of the landed Bombay duck during rainy seasons are often disposed because of the constraints in sun drying and rarely find its way to domestic market. The huge production of Bombay duck during peak season necessitates the production of high value products. However, presently, value added products from this fish are limited to laminated and dried Bombay duck. The major constraint in developing value added products from Bombay duck is its inferior meat texture with high moisture content, which forms jelly like mass on cooking. Also, the meat does not have a distinctive taste of its own in fresh form, even though a characteristic strong flavour is developed on drying. The reason behind high moisture content in Bombay duck flesh is still not clear; may be related to the intrinsic property of myofibrillar proteins which imparts high water holding capacity to the fish flesh.

The traditional practice of reducing the moisture content prior to cooking is by keeping a weight over the fish for certain period. This method is time consuming and is limited to fillets alone. As the flesh of Bombay duck is white in colour, it could be possible to develop mince based products from this fish by reducing the moisture content and thereby improving the cooking quality of mince. The water holding capacity of myofibrillar protein is highly related to the pH condition. The isoelectric point of Bombay duck protein is around pH 5. At this pH, protein-water interaction is less predominant than protein-protein interaction, which facilitates the easy removal of moisture from the meat. This can be achieved by using food grade weak acidifying agents such as citric acid, lactic acid, tartaric acid etc. Mumbai Research Centre of CIFT has developed a cost effective technology for reducing the moisture content

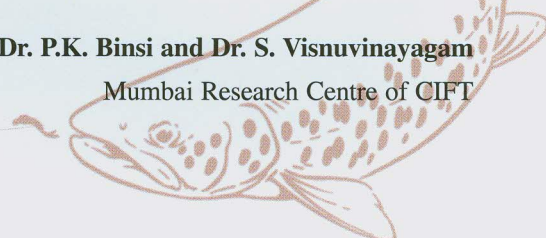
of Bombay duck mince and thus making the meat more suitable for product diversification. For this, the pH of water used for washing the mince was reduced to 3.0 by using a combination of filtered lemon concentrate and Sodium chloride in a pre-determined ratio based on preliminary experiments. This in-turn brought down the pH of mince to its isoelectric pH range of 5.0-5.5. In general, the modification in the washing procedure reduced the moisture content of fish meat by 5% compared to raw mince.

	Parameters in percentage			
	Moisture	Protein	Fat	Ash
Raw mince	90.05	8.13	0.65	0.41
Treated mince (2% lemon juice and 1% salt)	85.12	12.39	0.74	0.66

The washed mince was further evaluated for its suitability for the preparation of mince based products either by using alone or in combination with mince from a different species. This was done in a series of combinations of different minces. Balls with 100% treated Bombay duck mince and cutlets containing 90% Bombay duck mince and 10% Croaker mince showed better flavor and acceptability. The inferences derived from this study will be used for extending the research in the area of developing more innovative products to get more market realization for this under-utilized fishery resource.

P. Viji, Dr. P.K. Binsi and Dr. S. Visnuvinayagam

Mumbai Research Centre of CIFT



Model Hygienic Bulk Drying Yards for Bombay Duck

Bombay duck, a small pelagic fish landed in bulk along Saurashtra coast of Gujarat is abundant along North West and North East coast of India as also with the North West coast accounting for 88% of the landings. This fishery serves as livelihood for millions of fishermen along the coast and the average annual landings in India is around 1.15 lakh tonnes. The major landing centres for Bombay duck are Umbergaon, Jaffarabad, Rajpara, Navabandar located in Gujarat state and Diu. Due to high moisture content, the only processing method adopted for Bombay duck is drying which is done traditionally in stakes connected by ropes by scaffolding. Ninety percent of the Bombay duck processed from Saurashtra as dry fish is distributed through Mumbai to dry fish markets located as far as Goa, Tamil Nadu and the North East.

Less than 8% (around 400 to 600 tonnes) of the dry Bombay duck processed in drying yards in the coastal fishing villages get exported to countries like Sri Lanka, Mauritius, Bangladesh, UAE and Seychelles. Dry Bombay duck is highly appreciated in UK and was exported in bulk prior to 1997 when a ban on Bombay duck exports to EU was imposed pointing out the quality problems. The traditional drying done on ropes takes three days enabling flies to lay eggs on the open sundried products. Later the product packed unhygienically gets procured by dry fish merchants at the production site. Absence of proper marketing strategies to channelize dry Bombay duck to upcoming markets catering to quality conscious consumers who are willing to pay premium price is noteworthy.

Under the National Agricultural Innovation Project, 'Responsible harvesting and utilization of selected small pelagics and freshwater fishes (NAIP-RHSSP)', extensive studies on dry Bombay duck production and marketing conducted in and around Jaffarabad, Gujarat showed overall poor quality of products traditionally processed under highly unhygienic conditions. Upon laboratory testing, the products were seen to be prone to fungal and pest infestation with dust particles accumulated during the drying process. Creek water used for cleaning the fish before drying added to the bacterial load on the product.

Two seasons for Bombay duck landings termed as static phase (September to January) and dynamic phase (February to May) dictate the pricing of the dry Bombay duck product at the producer level which is variable and the average price per kilogram is ₹ 80/-. Due to bulk landings, high moisture content and the price sensitivity,

energy intensive mechanical methods involving investment and modern infrastructure may not be economical for adoption by the fishermen. Also the producers were not aware of the quality problems associated with the product processed in their traditional drying yards, the market value of quality products and the upcoming markets can be cornered by hygienically produced dry Bombay duck. Therefore attempts were made under the project to implement a user friendly, cost effective set-up which will avert the quality problems and evolve dust free products which are devoid of pest infestation. Jaffarabad, a major landing centre for Bombay duck production and processing was selected for the experimental trials.

A hygienic bulk drying system was designed and developed using fly proof nets, PVC pipes and indigenous water filtering system and its use demonstrated to the stakeholders. The samples of the end product evolved through the system was shown to local dry fish agents who were appreciative of the appearance of the product with the shape difference evolved by use of the hygienic bulk drying system. A protocol for handling, drying, storing and packing was standardized under the project. Appropriate packing and branding were also brought about. Also, cost effective production of improved laminated Bombay duck was attempted using power operated laminating machine developed under the project with encouraging results.

Market survey for the superior grade Bombay duck evolved out of the hygienic bulk drying system perceived good demand and market potential for hygienic, quality enhanced dry Bombay duck in Mumbai and NEH markets. Trial marketing of the superior grade dry Bombay duck, produced using the hygienic bulk drying system, was done at selected super markets in Mumbai showing acceptance



Bulk drying of Bombay duck in progress

for the product with response obtained both from premium consumers and dry fish merchants. A leading dry fish exporter based at Valsad, Gujarat has adopted the hygienic bulk drying system model for processing Bombay duck and is successfully marketing improved product under the brand name 'FISHSTIX' registered under the Project.

A commercially viable design of the hygienic bulk drying system improvised upon the model designed and

experimented at Jaffarabad was developed under the Project along with appropriate marketing strategy. For popularizing the business model for dried Bombay duck for domestic as well as export markets, the Project has associated with NETFISH and a commercial level drying facility was set up in Umbergaon, South Gujarat with funding from NETFISH during January, 2014. This facility which has a capacity of 2.5 tonnes consists of 24m x 9m drying chamber, a 12m x 3m solar dryer and laminating machine.

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Bacterial Tracking in *Lethrinus lentjan* (Lacepede, 1802) from Strategic Locations

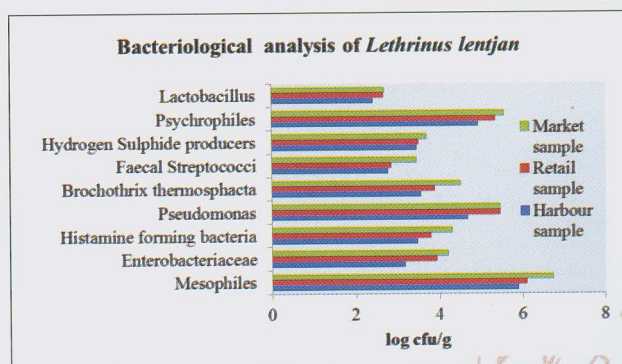
Fish is one of the most important sources of animal protein available in the tropics (Andrew, 2001). The quality of fresh fish is a major concern to industry and consumers. Deterioration of fish mainly occurs as a result of bacteriological activity leading to loss of quality and subsequent spoilage. Faulty rearing, harvesting and processing practices can result in cross contamination of fish with food-borne pathogenic bacteria (ICMSF, 1998). Even though epidemiological evidence on outbreak of food-borne disease is scarce, there are indications that foods could be contaminated to unsafe levels at the points of consumption with air flora and other microorganisms from handlers, equipments/utensils and the raw food materials (Edema *et al.*, 2005). Effective hygiene control through bacteriological testing is vital to ensure acceptable levels of contamination and avoid adverse human health consequences of food-borne illness (Moyo and Baudi, 2004; Ajao and Atere, 2009). However, contamination of the fish may occur from food handlers and retailers who sell these items to the public for consumption (Adebayo-Tayo *et al.*; 2011).

The microbial quality of an economically important fish *Lethrinus lentjan* (Pink ear emperor) collected from three strategic locations, harbour, retail fish stall and market were analyzed as per standard procedures. Fish samples were procured from harbour ($n=3$), retail fish stall ($n=3$) and from market ($n=3$), iced and brought to the laboratory within one hour. Quantitative and qualitative bacteriological analyses were performed. During analyses pathogens *Salmonella*, *Vibrio cholerae*, *V. parahaemolyticus* and *Listeria monocytogenes* could not be detected. The data

were analyzed using SPSS version 18.0.

Total microbial count is an important criteria for quality evaluation in fresh and frozen seafood products. According to the International Commission of Microbiological Standards for Foods (ICMSF, 1978) the maximum acceptable Aerobic Plate Count in fresh and frozen fish is 10^7 cfug⁻¹. In the present study the market sample exhibited higher Aerobic Plate Count which is 12.61% more than that reported for harbour samples. Bacterial load of fish from retail fish stall was 9.5% less than that of market samples. There was significant ($p<0.05$) variation between the samples as far as Aerobic Plate Count is concerned.

The progressive trend of bacteriological pattern of the fish studied is depicted in the Figure below:



Market samples gave a count of $5.55 \log_{10}$ cfu g⁻¹ for psychrophilic bacteria which is 11.2% more than harbour samples. Harbour to retail fish stall samples also exhibited an increase in count by 7.85%. Retail fish stall to market



samples also exhibited an increase in psychrophilic count but the variation was comparatively less (3.6%). Statistically there was significant ($p < 0.05$) variation between the samples. The presence of Enterobacteriaceae in fish and their spoilage potential are important. Enterobacteriaceae population showed an increase of 24.5% when the fish from harbour reaches market. Retail and market samples showed a variation of 6.4% while harbour and retail samples gave an increase of 19.3% in Enterobacteriaceae counts. As far as Enterobacteriaceae is concerned there was significant ($p < 0.05$) variation between the samples.

Harbour and retail fish stall samples showed the absence of *E. coli* but contamination with *E. coli* was noticed (3 MPN/100g) in market samples. This is an indication of post-harvest contamination and can be related to poor quality of water and ice, unhygienic handling or contaminated fish contact surfaces. Faecal Streptococci population also showed an increase by 19.9% in market samples than that of harbour samples. Retail and market samples gave a variation of about 17.74%. However statistically harbour and retail samples showed no significant variation ($p > 0.05$).

H₂S producing bacteria has been reported as the specific spoilage bacteria in fish from tropical waters and fresh fish stored aerobically. H₂S producing bacterial count in fish samples showed a progressive trend from harbour to market samples but no significant variation was noted ($p > 0.05$) between harbour and retail fish stall samples. Harbour samples showed 6.5% lesser count than that of market sample.

With regard to *Brochothrix thermosphacta*, the market sample exhibited a significant increase ($P < 0.05$) when compared to samples from other two areas. Fish samples showed an increasing trend in *B. thermosphacta* count, (about 21.23%) from harbour to market. Pseudomonades were found to be one of the dominant floras in the fishes. Pseudomonas counts of harbour sample was found to be 14.5% lesser than that of retail samples and there was significant ($p < 0.05$) variation between the samples. The Pseudomonas count of market sample and retail samples was found to be same ($5.46 \log_{10} \text{cfu g}^{-1}$). Gram negative enteric bacteria are primarily responsible for histamine formation in raw fish. The increasing trend of histamine forming bacterial count was 8.44% when the sample reached retail fish stall from harbour, which in turn showed an increase of 11.86% when it reached market. Significant increase ($P < 0.05$) in histamine forming bacterial count was noted from harbour to market sample (19.3%). Though there was slight increase in Lactobacilli counts, no significant variation ($p > 0.05$) was noted between retail and market samples. The market sample was found to have an increase of 9.66% in Lactobacillus count from the harbour sample.

The samples collected from the three strategic points were comparatively fresh. In all cases, highest counts were reported for market samples and the least for harbour samples. It is apparent that in samples examined, bacterial populations of market samples were higher than those obtained for harbour and retail fish stall samples, signifying the mishandling of fish during handling and transportation.

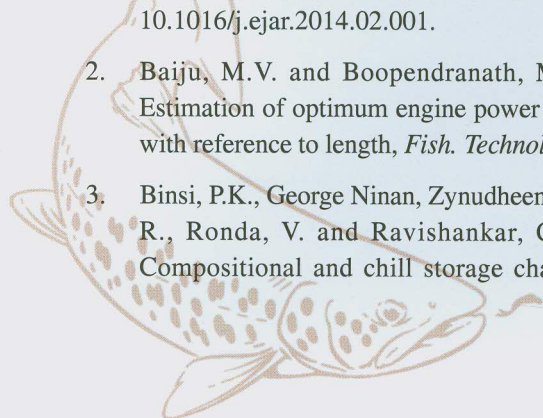
Dr. Femeena Hassan, Treesa Gracious, Dr. S. Sanjeev and Dr. T.V. Sankar

Quality Assurance and Management Division, CIFT, Cochin

Publications

Research Papers

1. Asha, K.K., Anandan, R., Suseela Mathew and Lakshmanan, P.T. (2014) – Biochemical profile of oyster *Crassostrea madrasensis* and its nutritional attributes, *Egyptian J. Aquatic Res.*, <http://dx.doi.org/10.1016/j.ejar.2014.02.001>.
2. Baiju, M.V. and Boopendranath, M.R. (2014) – Estimation of optimum engine power of fishing craft with reference to length, *Fish. Technol.*, **51(1)**: 67-69.
3. Binsi, P.K., George Ninan, Zynudheen, A.A., Neethu, R., Ronda, V. and Ravishankar, C.N. (2014) – Compositional and chill storage characteristics of microwave-blanching sutchi catfish (*Pangasianodon hypophthalmus*) fillets, *Intl. J. Food Sci. & Technol.*, **49(2)**: 364-372.
4. Jeyakumari, A., Kothari, D.C. and Venkateshwarlu, G. (2014) – Microencapsulation of fish oil-milk based emulsion by spray drying: Impact on oxidative stability, *Fish. Technol.*, **51(1)**: 31-37.
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6. Madhu, V.R., Prasad, K.P. and Hima Alim (2014) –



Effect of Benzalkonium chloride (BKC) on the blood cells and immune system of *Clarius batrachus*, *Intl. J. Fish. & Aquatic Studies*, **1(4)**: 32-40.

7. Narasimha Murthy, L., Madhusudana Rao, B., Asha, K.K. and Prasad, M.M. (2014) – Extraction and quality evaluation of yellowfin tuna bone powder, *Fish. Technol.*, **51(1)**: 38-42.
8. Parvathy, U., Jibina, M.M. and Sajan George (2014) – Effect of cryoprotectants on the frozen storage stability of mince and quality of mince-based products from *Nemipterus japonicus* (Bloch, 1791), *Fish. Technol.*, **51(1)**: 47-53.
9. Rajeswari, G., Raghu Prakash, R., Sreedhar, U. and Swamy Kumar, M. (2013) – Size selectivity of diamond and square mesh codends for largehead hairtail *Trichiurus lepturus* Linnaeus, 1758, *Indian J. Fish.*, **60(4)**: 13-16.
10. Sary, P.S., Pramod Kiran, R.B., Sandhya, R., Anitha, R. and Madhu, V.R. (2014) – Comparative analysis of operational parameters and catch composition of 'Jattuvala' and 'Vaanguvala' operated in the culture based fisheries in Vellayani lake, Thiruvananthapuram, *J. Aquatic Biol. & Fish.*, **12(1)**: 229-232.
11. Shashidhar, K., Ravishankar, C.N., Srinivasa Gopal, T.K. and Jose Joseph (2014) – Standardization of process parameters for ready-to-drink shrimp soup in retortable pouches, *Fish. Technol.*, **51(1)**: 43-46.
12. Sreedhar, U., Sudhakar, G.V.S. and Meenakumari, B. (2013) – Length-weight relationship of deepsea demersal fishes from the Indian EEZ, *Indian J. Fish.*, **60(3)**: 1-6.
13. Sudhakar, G.V.S., Sreedhar, U. and Meenakumari, B. (2013) – Abundance, bathymetric distribution and diversity of deep sea demersal finfish resources along the south-west coast of India, *Indian J. Fish.*, **60(4)**: 1-6.
14. Swamy Kumar, M., Rajeswari, G., Sreeramulu, K. and Kishore, B. (2014) – Length-weight relationship and condition factor of karut croaker *Johnius carutta* Bloch, 1793 off Visakhapatnam, South-east coast of India, *Indian J. Fish.*, **61(4)**: 96-98.
15. Shiny, K., Hema, G.S., George Ninan, Suseela Mathew, Joshy, C.G. and Lakshmanan, P.T. (2014) – Isolation and characterization of gelatin from skins of Skipjack tuna (*Katsuwonus pelamis*), Dog shark (*Scolidon sorrakowah*) and Rohu (*Labeo rohita*), *J. Food Hydrocolloides*, **39**: 68-76.
16. Usha Bhagirathan, Meenakumari, B., Panda, S.K., Madhu, V.R., Vaghela, D.T. and Jethwa, B.K. (2014) – Impact of bottom trawling on the epifauna off Veraval coast, India, *Indian J. Geo-Marine Sci.*, **43(2)**: 294-305.
17. Usha Bhagirathan, Shaju, S.S., Rajesh, N., Meenakumari, B. and Muhamed Ashraf, P. (2014) – Observations on bio-optical properties of phytoplankton bloom in coastal waters off Cochin during the onset of south west monsoon, *Indian J. Geo-Marine Sci.*, **43(2)**: 289-296.

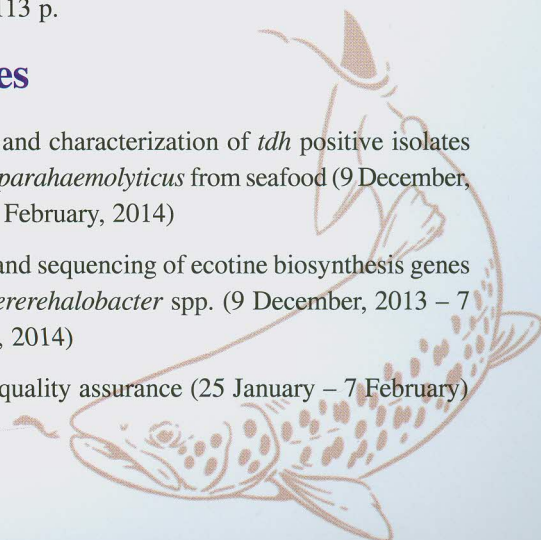
Books

1. Leela Edwin, P. Pravin, Saly N. Thomas, M.P. Remesan, M.V. Baiju, V.R. Madhu, Renju Ravi, P.H. Dhijudas, M.R. Boopendranath and B. Meenakumari (2014) – Mechanized marine fishing systems: India, CIFT, Cochin, 225 p.
2. Leela Edwin, Saly N. Thomas, P. Pravin, M.P. Remesan, V.R. Madhu, M.V. Baiju, P.T. Sreejith, Renju Ravi and P.H. Dhijudas (2014) – Mechanized marine fishing systems: Kerala, CIFT Fishing Systems Catalogue -1, CIFT, Cochin, 111 p.
3. Nikita Gopal, V. Radhakrishnan Nair, P. Jeyanthi, V. Chandrasekar and S. Balasubramaniam (2014) – Marketing research for value chain in fisheries, CIFT, Cochin, 113 p.

Training Programmes

Cochin

1. Canning of fish and shellfish (4-13 January)
2. Microbiological analysis of water and handling of reference cultures (7-9 January)
3. Fish processing technology (15-20 January)
4. Testing of packaging materials (20-25 January)
5. Isolation and characterization of *tdh* positive isolates of *Vibrio parahaemolyticus* from seafood (9 December, 2013 – 7 February, 2014)
6. Cloning and sequencing of ecotone biosynthesis genes from *Haererehalobacter* spp. (9 December, 2013 – 7 February, 2014)
7. Seafood quality assurance (25 January – 7 February)





8. Preparation of fish and prawn pickle (28-29 January)
9. Products development and quality evaluation of fishery products (1-28 February)
10. HACCP concepts (10-14 February)
11. Modern analytical techniques in biochemistry (21 February – 5 March)
12. Production of chitin and chitosan and quality analysis (3-5 March)
13. Preparation of chitin, chitosan and glucosamine (19-

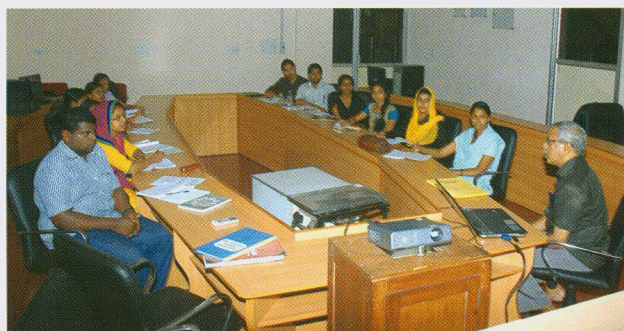
21 March)

Visakhapatnam

1. Microbiology (21 January – 11 February)
2. Heavy metal analysis in freshwater and marine fishes (25 January-25 February)

Mumbai

1. Preparation of value added fisheries products (6-8 January)



Seafood quality assurance (Cochin)



HACCP concepts (Cochin)



Products development and quality evaluation of fishery products (Cochin)



Preparation of value added fisheries products (Mumbai)

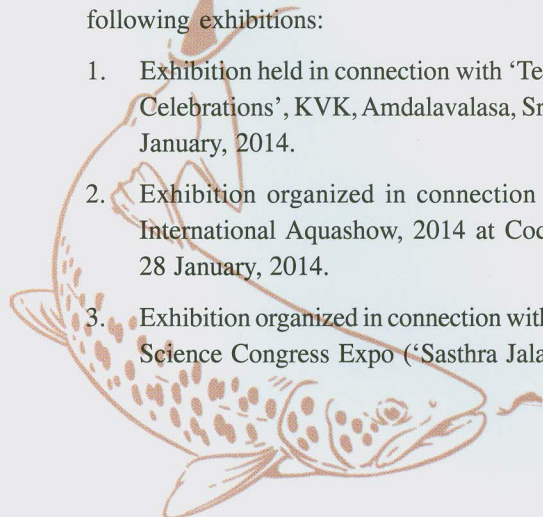
Participation in Exhibitions

During the quarter the Institute participated in the following exhibitions:

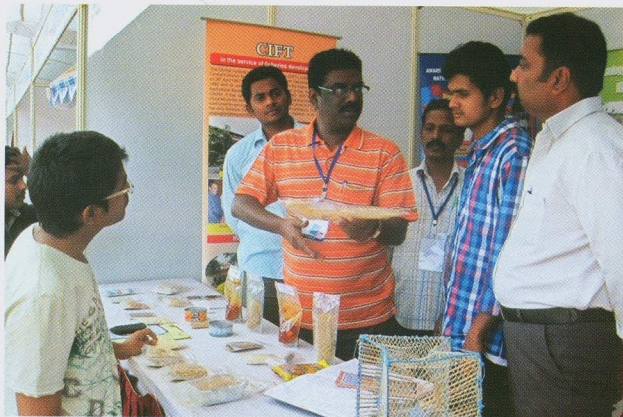
1. Exhibition held in connection with 'Technology Week Celebrations', KVK, Amdalavalasa, Srikakulam on 23 January, 2014.
2. Exhibition organized in connection with the India International Aquashow, 2014 at Cochin during 24-28 January, 2014.
3. Exhibition organized in connection with the 26th Kerala Science Congress Expo ('Sasthra Jalakam, 2014') at

Wayanad during 28-31 January, 2014.

4. Exhibition held in connection with the Consultation workshop on Self-sufficient and sustainable aquaculture in north eastern region, Agarthala on 5 February, 2014.
5. 12th Rural Technology and Crafts Exhibition at NIRD, Hyderabad during 14-19 February, 2014.
6. Exhibition held in connection with 'Spandana-Girijanotsavamulu-2014' at Parvatipuram, Vizianagaram district, Andhra Pradesh on 23 February, 2014.



7. 57th Kisan Mela held at ANGR Agricultural University, Anakapalle during 14-15 March, 2014.



12th Rural Technology & Crafts Exhibition at NIRD, Hyderabad



Receiving participation certificate at '57th Kisan Mela', Anakapalle, A.P.



International Aquashow, Cochin

8. Exhibition held in connection with "ShellCon 2014" at CMFRI, Cochin during 22-23 March, 2014.



Smt. I.R. Sangma, Director of Fisheries, Govt. of Meghalaya at CIFT stall, Agarthala



Kerala Science Congress, Wayanad



"ShellCon 2014", Cochin

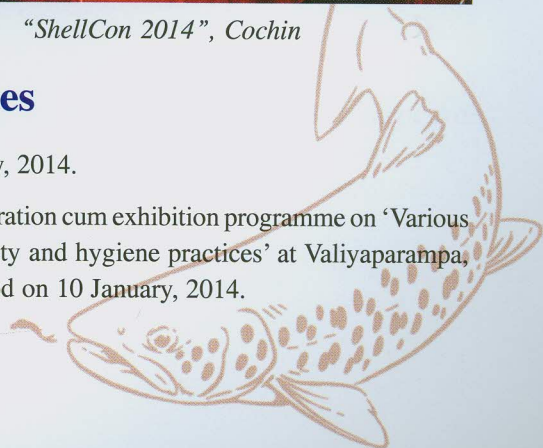
Outreach Programmes

During the quarter the following outreach programmes were conducted by the Institute:

1. Training programme on 'Challenges and opportunities in personal hygiene' at Valiyaparampa, Kasaragod on

9 January, 2014.

2. Demonstration cum exhibition programme on 'Various food safety and hygiene practices' at Valiyaparampa, Kasaragod on 10 January, 2014.





3. Tribal Sub Plan Programme at Venkatapuram, a remote fishing hamlet adjoining Tandava Reservoir, Visakhapatnam district of Andhra Pradesh on 18 February, 2014.
4. Tribal Sub Plan Programme at Shahpur, an inland fishing village in Thane district of Maharashtra on 21 February, 2014.
5. *Spandana - Girijanotsavamulu* 2014 at Parvatipuram, Vizianagaram district, Andhra Pradesh on 23 February, 2014.
6. Training programme on 'Hygienic handling of dry fish' at Visakhapatnam Fishing Harbour on 25 February, 2014.
7. Training programme on 'Hygienic fish handling and production of value added fishery products' at Thaikkal, Alappuzha district during 25-26 February, 2014.
8. Training programme on Hygienic handling of fish at PCR Lab, Kotturu, Visakhapatnam on 1 March, 2014.
9. Tribal Sub Plan Programme at Jagadapur, Chattisgarh during 4-6 March, 2014.
10. Tribal Sub Plan Programme at Jeenabadu fishing village, Raiwada reservoir and Konam village, Sri Vechalapu Palavelli reservoir on 13 March, 2014.
11. Training programme on Hygienic handling of fish and preparation of value added fish products at PCR Lab, Mangamaripetta, Visakhapatnam during 21-22 March, 2014.
12. Training on Responsible fishing methods at Meenkara, Palakkad on 27 March, 2014.
13. Training on Hygienic fish handling and value added fishery products at Meenkara, Palakkad during 28-29 March, 2014.

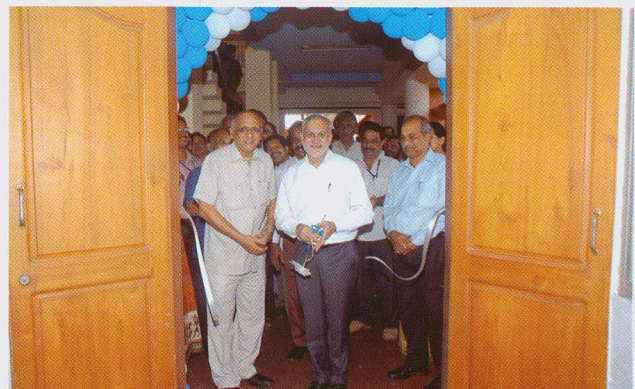
DG, ICAR Visits CIFT, Cochin

Dr. S. Ayyappan, Secretary, DARE and Director General, ICAR, New Delhi visited CIFT, Cochin on 22 January, 2013. He visited the laboratories of the Institute

and had discussions with the scientists on the ongoing research activities. Later he inaugurated the modernized roof top auditorium of the Institute.



Dr. S. Ayyappan addressing the staff



DG, ICAR inaugurating the renovated auditorium

International Workshop cum Training Programme on Fisheries Management

CIFT-FAO International Workshop cum Training Programme on "Technical Measures as Tools for Fisheries Management in the Indian Scenario" was organized by the Fishing Technology Division of CIFT, Cochin on 12 February, 2014. The programme was organized under the project "Green Fishing Systems for Tropical Seas" funded by National Fund for Basic, Strategic and Frontier

Application Research in Agriculture (NFBSFARA) of ICAR. Seventy stakeholders including scientists, researchers, academicians, policy makers, fishers and international experts participated in the programme to make a roadmap for developing strategies for adoption of technical measures for effective management of marine fisheries in India.



Chief Guest and Moderator, Dr. Y.S. Yadava, Director, Bay of Bengal Programme Inter-Governmental Organization (BOBP-IGO) inaugurated the Workshop and stressed the importance of sustainable fishing in his inaugural address. Dr. Petri Suuronen, Fishery Industry Officer (Fishing Technology), FAO, Rome, the main resource person addressed the gathering and specified the need for combining fishing technology with governance. Dr. T.K. Srinivasa Gopal, Director, CIFT in his presidential address pointed out the need for energy saving in the fisheries sector in the context of increasing fuel prices and the rising fishing fleet size. Dr. Leela Edwin, Convener and Principal Investigator of the Project gave a brief of the workshop. Dr. Saly N. Thomas, Principal Scientist welcomed the gathering and Dr. V.R. Madhu, Senior Scientist proposed the vote of thanks.

A book on "Mechanized Marine Fishing Systems: India" authored by Leela Edwin, P. Pravin, V.R. Madhu, Saly N. Thomas, M.P. Ramesan, M.V. Baiju, Renju Ravi, P.H. Dhiju Das, M.R. Boopendranath and B. Meenakumari was released on the occasion.

The technical session started with an introductory presentation by Dr. Y.S. Yadava. He pointed out the



Dr. Y.S. Yadava inaugurating the Workshop



Release of the book on 'Mechanized Marine Fishing Systems: India'



Participants with resource persons

National Conference titled VALUE FISH 2014

A National Conference on 'Emerging Safety and Technological Issues in Seafood Industry' (VALUE FISH – 2014) was organized at CIFT Veraval Research Centre during 14-15 March, 2014 by the Zonal Technology Management – Business Planning & Development (ZTM-BPD) Unit of CIFT in association with National Fisheries Development Board (NFDB), Hyderabad and Central Food Technological Research Institute (CFTRI), Mysore. The event was organized to identify the emerging technological trends in seafood industry, and also realizing the challenges in international and national trade, and in meeting consumer expectations.

Dr. K. Radhakrishna, Additional Director, Defence Food Research Laboratory (DFRL) inaugurated the conference. During his inaugural address he said that fish play an important role in ensuring the nutritional security of the country. He also appreciated the role of CIFT in promoting responsible and sustainable harvest and post harvest technologies in fisheries sector by conducting basic, strategic and applied research, and undertaking consultancy, training, testing and technology transfer.

Dr. T.K. Srinivasa Gopal, Director, CIFT, Cochin presided over the meeting. During his address he said that

in the last few decades, there have been significant developments in food processing technology that have opened up various new possibilities for more value added products of longer shelf-life, and more secure distribution of fresh food. This is particularly important for fish and fishery products because of their inherent short shelf-life. Later he mentioned that National Conference, "Value Fish 2014" will provide an excellent opportunity to interact, network, and exchange information, ideas and business opportunities among scientists, fishery entrepreneurs and state machinery.

Dr. C.K. Murthy, Executive Director, NFDB, Hyderabad, Dr. A.Y. Desai, Dean College of Fisheries, Veraval and Shri Lakhambhai Bhensla, President, Seafood Exporters Association of India, Gujarat Chapter were present in the inaugural function. Earlier, Dr. C.N. Ravishankar, Principal Scientist & Head, Fish Processing Division, CIFT, Cochin welcomed the participants. Finally Dr. R. Badonia, Scientist-in-Charge, CIFT Research Centre, Veraval proposed the vote of thanks.

VALUE FISH 2014 consisted of exclusive technical conference sessions that featured technical presentations and interactive discussions for providing a topical arena for the industry professionals to enhance their technical knowledge, and share ideas with scientific community. The Technical Sessions covered topics like advances in fish processing technology, safety and regulatory issues in seafood industry, industry reflections, role of developmental agencies and interactive session on future needs on capacity building/EDP, infrastructure including incubation centers, regulations and interventions from research and developmental agencies. The Conference was attended by representatives from seafood industry, officials from State Fisheries Departments, Scientists and Professors from State Agriculture Universities, different research organizations and KVKs.



Dr. K. Radhakrishna inaugurating the conference



Dr. T.K. Srinivasa Gopal delivering the presidential address



Dr. C.N. Ravishankar welcoming the gathering

Training on Data Analysis Using SAS

At CIFT, Cochin a training on 'Data analysis using SAS' was organized under the NAIP on 'Strengthening statistical computing for NARS' during 1-7 February, 2014. The inaugural function of the training programme was held on 1 February, 2014. Dr. V. Geethalakshmi, Principal Scientist and Course Director of the training welcomed the participants and Dr. Gopinath Rao, Professor, Department of Agricultural Statistics, UAS, Bangalore and Zonal Coordinator of the NAIP project gave a brief introduction on the project. Dr. Leela Edwin, HOD, FT and Director I/c, CIFT who presided over the function stressed on the importance of Statistics in agricultural research and the need to bring about quality research output using advanced statistical software like SAS. There were a total of 23 registered participants for the training programme who were scientists, teachers and academicians from varied fields of research in agriculture, veterinary and fishery sciences in ICAR institutes and agricultural universities. The inaugural session of the programme ended with a formal vote of thanks

by Dr. Somy Kuriakose, Senior Scientist, CMFRI, Cochin who was one of the Course Coordinators. Dr. K.G. Mini, Senior Scientist, CMFRI and Shri C.G. Joshy, Scientist, CIFT, Cochin were the other Course Coordinators.

The various topics covered were basic statistical tools, SAS data sets, logistic regression, multivariate statistical analysis, design and analysis of experiments, time series analysis, SAS genomics, SAS for genetics and breeding experiments, conjoint analysis using SAS, response surface models using SAS, SAS Enterprise Guide, SAS for statistical modelling and SAS for quantitative fishery science. The training sessions were handled by experts in the field of agricultural statistics from various ICAR institutes.

The valedictory function of the training was held on 7 February, 2014 and Dr. Mini welcomed the participants, Dr. T.K. Srinivasa Gopal, Director, CIFT, Cochin presided over the function and handed over the certificates to the participants. The training report was read by Dr. Gopinath. The feedback obtained from the participants was positive and they suggested to conduct more customized training programmes in statistical computing software in future. The valedictory function ended with a vote of thanks by Dr. V. Geethalakshmi.



Dr. Gopinath Rao inaugurating the programme



Dr. T.K. Srinivasa Gopal distributing the participation certificate



Training in progress



Participants of the training with faculty

National Workshop cum Training on High Pressure Processing for Food Preservation

A National Workshop cum Training on “High Pressure Processing for Food Preservation” was organized under NAIP Sub Project “Studies on High Pressure Processing (HPP) of High Value Perishable Commodities” on 7 March, 2014 at CIFT, Cochin. The Workshop was organized to impart the knowledge and experience gained under the Sub project to industry, scientists, teachers, research scholar's etc. working in food and related areas so as to equip them with the latest advancements in the high pressure processing. About 40 participants attended the Workshop cum Training. Dr. J. Bindu, Senior Scientist and CPI of the project welcomed the gathering and gave an introduction to the workshop. Dr. T.K. Srinivasa Gopal, Director, CIFT inaugurated the Workshop and in his welcome speech remarked that pressure processing is a novel processing technique that is being increasingly adopted to preserve high value foods in order to retain its freshness like characteristics. CIFT is the only institute under ICAR system

having the high pressure processing facility in the country. Dr. P. Srinivasa Rao, Associate Professor, IIT Kharagpur and consortium partner of the project also spoke on the occasion.

Various technical sessions related to the emerging technology were handled by national experts. Dr. J. Bindu, in the first lecture introduced the topic to the trainees and presented the activities undertaken in the project with respect to seafoods. Dr. P. Srinivasa Rao spoke on High pressure processing of perishable fruits and on the engineering aspects of the technology. The effect of high pressure on biological systems was handled by Dr. Venkateswarlu Ronda, Scientist, CIFT and Dr. S.K. Panda, Senior Scientist, CIFT spoke on the effect of high pressure on microorganisms. Dr. K.K. Asha, Senior Scientist, CIFT and Associate of the project spoke on the biochemical aspects of high pressure.

In the afternoon session the working principle of high pressure processing machine was explained and practical demonstration by processing seafoods was done. In the concluding session certificates were distributed by Dr. Srinivasa Gopal to the participants. The feedback from the participants about the training was positive and they mentioned that the programme was really beneficial for them in understanding a new emerging non-thermal technology. Dr. K.K. Asha proposed vote of thanks.



Dr. T.K. Srinivasa Gopal inaugurating the programme



Dr. P. Srinivasa Rao speaking on the occasion



Demonstration in progress

National Trainers' Training Programme on Monofilament Long Lining

Recognizing the importance of the emerging oceanic tuna fisheries in Indian economy, the CIFT, Cochin and the CIFNET, Cochin jointly organized a National Trainers' Training Programme on Monofilament Long Lining for ten stakeholders sponsored by the Department of Fisheries,

Tamil Nadu, Govt. of Tamil Nadu during 24-28 March, 2014.

The training programme was inaugurated by Shri R.C. Sinha, Director, CIFNET, Cochin on 24 March, 2014 and the function was presided by Dr. T.K. Srinivasa Gopal,



Shri R.C. Sinha, Director, CIFNET, Cochin delivering the inaugural address

Director, CIFT, Cochin. Dr. Leela Edwin, Principal Scientist & Head of Division, Fishing Technology welcomed the gathering and Dr. P. Pravin, Principal Scientist proposed the vote of thanks.

The training programme was attended by nine fishermen from Tamil Nadu and an official from the State Fisheries Department, Tamil Nadu. The five days training programme consisted of both theory and practical classes. The theory subjects covered were: (i) Tuna resources of India, (ii) Long line fishing techniques for tuna, (iii) Deck machinery for monofilament tuna long lining, and (iv) Sea safety, Seamanship and Navigation. A fishing voyage on monofilament long lining was organized for three days on-board CIFNET training vessel M.V. Prashikshani. Fishing operations were carried out at 09° 52.7 'N 075° 25.425'E in depth of 1700 m. The participants were familiarized with handling, shooting and hauling of the monofilament long lines. A total of 270 hooks were operated.

Theory classes on Sea safety, Seamanship and Navigation was held at CIFNET, Cochin. The valedictory function was held at CIFNET on 28 March, 2014. Dr. Jomon Joseph, Chief Instructor, (FT) & Head, Fishing Technology Division, CIFNET, Cochin welcomed the gathering. Dr. T.K. Srinivasa Gopal, Director, CIFT, Cochin was the Chief



Trainees from Tamil Nadu on-board CIFNET training vessel M.V. Prashikshani

Guest of the function and he distributed the certificates to the trainees. Shri R.C. Sinha, Director, CIFNET, Cochin also addressed the gathering. Trainee representatives gave the feedback of the training programme and requested for arranging marketing links for export of sashimi grade tuna. Shri M.V. Baiju, Senior Scientist & Naval Architect, CIFT Cochin proposed the vote of thanks.

This is the first batch of the National Trainers Training Programme on Monofilament long lining. It is proposed to conduct a series of training programmes for the benefit of fishermen and officials from different states of the country.



Trainees from Tamil Nadu along with Director, CIFNET and faculty from CIFT and CIFNET

Training on Hygienic Bulk Drying of Bombay Duck

A training programme on 'Hygienic bulk drying of Bombay duck' was conducted at Umbergaon Fishermen's Sarvodya Sahakari Society on 24 March, 2014. Around 70 fish processors participated in the Workshop-cum-training programme. The programme started with a welcome by Kum. Sindhu, a social activist at Umbergaon who briefed the stakeholders about the Project. Shri Jitu Bhai Tandle, President of the Umbergaon Fishermen's Sarvodya Sahakari Society explained to the stakeholders the importance of the

Project and appreciated the efforts put up by the project team at Umbergaon. Dr. K.V. Lalitha, CPI, NAIP-RHSSP who gave the presidential address, urged the participants the need to bring out quality improvement in Bombay duck. She requested the participants to derive maximum benefit from the interventions done by the project team. Shri Jignesh Visavadia, State Coordinator, NETFISH, Gujarat explained to the participants the merits of the hygienic bulk drying system set up at Umbergaon. Dr. V. Geethalakshmi,



Principal Scientist & Co-PI of the project stressed that quality improvement in dry Bombay duck will certainly result in enhanced price for the product and open up premium market for Bombay duck products. A formal Vote of Thanks was proposed by Shri Apurva Vasava, Secretary of the Umbergaon Society.

Dr. K.A. Martin Xavier, Scientist, Central Institute of Fisheries Education, Mumbai imparted the training on processing, drying and packing of Bombay duck using the model drying facility. The laminating machine developed under NAIP-RHSSP project which has been installed at Umbergaon was also demonstrated during the 3-day programme.



Dr. K.V. Lalitha giving the presidential address

Keel Laid for Energy Efficient Combination Fishing Vessel

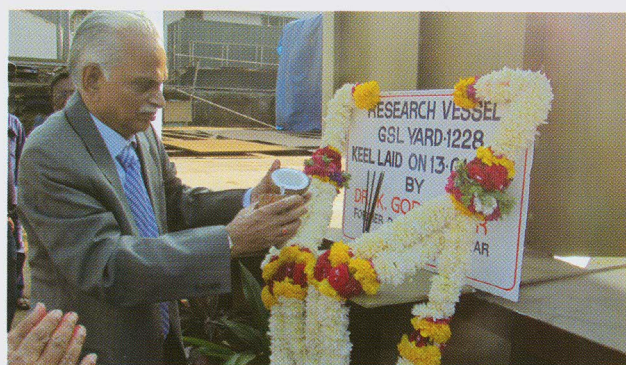
The Keel laying ceremony for the 19.8 m energy efficient combination fishing vessel, jointly designed by CIFT, Cochin and Goa Shipyard Ltd., was held at Vasco, on 13 January, 2014. This vessel is being constructed by GSL under the project 'Green Fishing Systems for Tropical Seas' funded by National Fund for Basic, Strategic and Frontier Application Research in Agriculture (NFBSFARA). This vessel is being designed by analyzing the hull form using computational fluid dynamics software and model testing in a towing tank. The novel features are bulbous bow, refrigerated sea water tank, solar panels, hydraulic long line winch, split trawl winch, hydraulic gillnet hauler, efficient propulsion and bilge keel making it remarkable from the conventional vessels.

Dr. K. Gopakumar, former Deputy Director General (Fisheries), ICAR, New Delhi and the Chief Guest of the

day laid the keel in the presence of Shri Sanjeev Sharma, Chairman & Managing Director in charge, GSL. Dr. T.K. Srinivasa Gopal, Director, CIFT, Dr. K.A. Simon, Director, Kunjali Marakkar School of Marine Engineering (KMSME), CUSAT, Cochin, Shri Raghuveer Singh, General Manager (GES & SR), GSL, Senior officials of GSL, Dr. A.K. Bhargava, Zonal Director, Fishery Survey of India, Scientists from ICAR Research Complex, Goa, Dr. P. Pravin, Dr. Saly N. Thomas, Dr. M.P. Remesan, Shri M.V. Baiju and Dr. V.R. Madhu, Scientists and Co-Principal Investigators of the project, CIFT, representatives from Fishermen and Boat Owners Association were also present on the occasion. Dr. Leela Edwin, Head & Principal Investigator of the project, Fishing Technology Division, CIFT thanked the officials for the support extended for the different activities of the project.



Dr. K. Gopakumar laying the keel of energy efficient combination fishing vessel



CIFT Sun Boat Launched by Hon'ble Fisheries Minister

At a function organized by the Fishing Technology Division of the CIFT, Cochin, Shri K. Babu, Hon'ble Minister for Fisheries, Ports and Excise, Govt. of Kerala

launched the CIFT Sun Boat, a solar powered boat on 23 February, 2014 at Matsyafed Njarakkal Fish Farm in presence of Dr. T.K. Srinivasa Gopal, Director, CIFT. The





Shri K. Babu launching the boat

boat with length of 3.6 m is twin hulled and is solely propelled by solar power. It can be put to use in aqua farms for aquacultural purposes and for gillnetting, line fishing, transportation and aqua tourism. It's main advantages are that it does not burn fuel, there is no atmospheric or sound pollution, has more deck space with clean FRP surface for fish handling and is suitable for shallow waters. The CIFT Sun Boat is costlier than the conventional boat but the additional cost is compensated by the fuel saved. The Minister while congratulating the institute said that such ventures will make fishing more viable especially in the context of limited fossil fuels. Dr. Srinivasa Gopal in his presidential address expressed his happiness that the



The dignitaries in the boat after the launching

institute has been successful in introducing ecofriendly solar technologies in vessel propulsion. Shri M.V. Baiju, Senior Scientist and Naval Architect spoke on the main features of the new fishing vessel and its advantages over conventional fishing vessels. Shri K.S. Sajeevan, Manager, Aqua Division, Matsyafed offered felicitation. Dr. S. Girija, Director, NIFPHATT, Cochin and Shri R.C. Sinha, Director, CIFNET, Cochin graced the occasion. Representatives of inland fishermen organizations attended the meeting. Dr. Leela Edwin, Head and Principal Scientist, Fishing Technology Division, CIFT welcomed the gathering and Dr. M.P. Remesan, Principal Scientist, Fishing Technology Division, CIFT proposed the vote of thanks.

Scientific Panel on Fish and Fishery Products of Food Safety Standards Authority of India at CIFT

Meeting of the Scientific Panel on Fish and Fishery Products of Food Safety Standards Authority of India, New Delhi was held at CIFT, Cochin during 23-24 January, 2014. Dr. S. Ayyappan, Director General, ICAR, the Chairman of the panel and other members including Directors of fisheries institutes in India attended the meeting. The standards developed for fish and fishery products for domestic and export were reviewed. Code of practises prepared were also

presented and deliberated at length. The code of practises presented include:

- a. Draft Code of Hygiene Practices in the Entire Supply Chain for Marketing of Fish and Fishery Products, Part I (Fish catching to handling, storage on-board and transportation to processing plants/factories and whole sale markets)



Dr. S. Ayyappan, DG, ICAR conducting the meeting



Dr. T.K. Srinivasa Gopal, Director, CIFT, Cochin speaking on the occasion



- b. Draft Code of Hygiene Practices in the Entire Supply Chain for Marketing of Fish and Fishery Products, Part II (deals with Code of Practice for safe fish handling and processing from Raw Material Receiving Station in Processing Plants/Factories to Shipment)
- c. Draft Code of Hygiene Practices in the Entire Chain of Custody for Marketing of Fish and Fishery products,

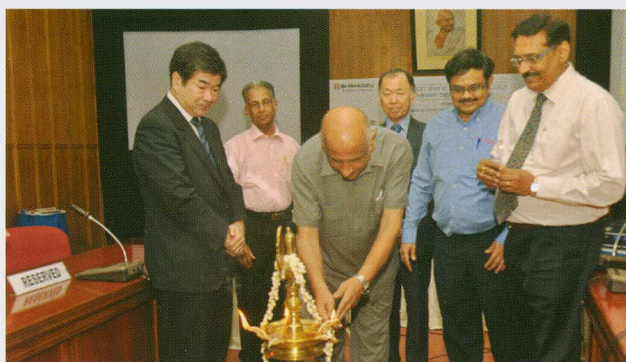
Part III (deals with Code of Practice for safe fish and shellfish handling from Processing Factories to Retail)

- d. Draft Code of Hygiene Practices in the Entire Chain of Custody for Marketing of Fish and Fishery products, Part IV (deals with Code of Practice for Hoteliers and Catering personnel)

Food Safety Technology Seminar

M/s. Shimadzu and CIFT, Cochin conducted a one day seminar on Food Safety Technology Series 2013-14 on 7 January, 2014. Dr. T.K. Srinivas Gopal, Director, CIFT inaugurated the Seminar and Dr. T.V. Sankar, HOD, QAM chaired the Session on Latest trends in food risk

management and gave a talk on 'Food risk challenges in developing countries' while Dr. K. Ashok Kumar, Principal Scientist chaired a session on Analytical challenges and solutions and gave a talk on 'Challenges in food testing'.



Dr. T.K. Srinivasa Gopal Inaugurating the Seminar



Participants of the Seminar

Food Safety Management Certification Seminar

CIFT, Cochin in association with Bureau of Indian Standards organized a one day Seminar on 'Food safety

management system certification' at CIFT, Cochin on 28 March, 2014.

Training Programme on ISO 9001

Two days Internal Auditor Training Course for Auditing of Quality Management Systems confirming to ISO 9001-2008 was conducted during 3-4 January, 2014 for the members of the Steering Committee and Programme

Committee for implementing ISO standards at CIFT, Cochin. Further an Awareness Training Programme on ISO 9001-2008 was conducted at CIFT Cochin during 11-13 February, 2014 for the benefit of the staff of the Institute.

User Awareness Programme

An 'User awareness programme' to sensitize the users of CIFT about the innovative services developed under the

e-Granth project at the Institute was held on 29 March, 2014.

Evaluation of Technology Transfer Models

A technology transfer interventional programme on "Hygienic fish handling and production of value added fishery products" was conducted at Thaikkal, Alappuzha

district during 25-26 February, 2014. Forty sponsored group members of Fishermen Welfare Development Co-operative Society (FWDCS), Thaikkal participated in the training.





Shri K.C. Sivanand, District Manager, Matsyafed, Alappuzha inaugurating the training

Data on the socio-economic conditions of the respondents were collected besides their awareness and symbolic adoption (decision to use) about ten improved practices on hygienic fish handling and production of value



Participants attending practical training session

added fish products. The pre-training and post-training evaluation data revealed that their mean awareness score and symbolic adoption score had significantly increased after the training.

Another Training cum demonstration programme on “Hygienic handling of fish and preparation of value added fish products” was organized by CIFT, Visakhapatnam in collaboration with District Fishermen Youth Welfare Association (DFYWA), Visakhapatnam for the benefit of women belonging to fisher community at PCR Lab, Mangamaripeta, Visakhapatnam during 21-22 March, 2014. Different demonstration sessions were held on hygienic handling of fish and preparation of value added products from fish and prawn. Inputs such as ice box and heat sealing machine were handed over to the beneficiaries during the programme. Thirty women were benefited by the programme.



Dr. M.M. Prasad addressing the beneficiaries during the training



Demonstration session on hygienic handling of fish during the training



Beneficiaries of the training programme of Mangamaripeta, Visakhapatnam

A New Business Model for Trading Fresh Fish

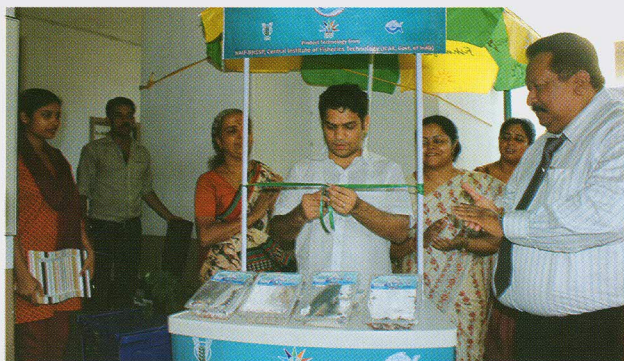
As a part of NAIP of ICAR operational in CIFT, a new business model has been developed for trading fresh fish under the brand name “Seafresh”. The sale of hygienically cleaned and packed fresh fish through

“signature kiosks” has been initiated at various locations in Ernakulam district. “Seafresh” was officially launched by Shri Hibi Eden, MLA, Ernakulam on 19 February, 2014 at St. Albert’s College. During the inaugural function, the



portable kiosks were distributed by Shri Hibi Eden to the students of St. Albert's College. Also, the first sale was done by him. Almost 15 students belonging to Fisheries Science Department of St. Albert's College, Ernakulam have come forward for the marketing of 'Seafresh' at locations like Palarivattom, Kaloor, Thevara, High Court Junction and Kadavantra in Ernakulam district. The processed fresh fish packed in 500g and 1kg packets are being sold through kiosks placed at roadsides from 3 PM to 6 PM during working days by the students, after the class time. The Fisheries Science students including girls have taken up the marketing activities of Seafresh which has helped in wiping off the social stigma related to fish trade and has helped to elevate the status of the occupation. This venture also gives an opportunity for women from coastal belt to earn a subsidiary income. At production end, the primary producers (fisherfolk) are getting an increased price for their fish when they bring it in good quality demanded by the project team. In the processing centre, the women get income

for hygienically dressing and packing. The persons engaged in trading also derives a margin and customers get the value added fresh fish at almost same cost as that of other fishes, as there is no middle men's share. Under the guidance of NAIP-RHSSP team, processing units have been initiated at Ochanthuruth, Ernakulam and Kollam, which are being operated by fisherwomen trained in hygienically processing the high quality fresh fish acquired directly from fishing harbor, considering HACCP protocols. More kiosks are coming up at 15 more different locations in the district. More processing units will be established later as the market spread out. In the production units, the fresh fish procured from selected fishing boats under quality direction are dressed and packed in special LDPE sealed trays in chilled condition and make it ready for sale. The business model is a solution for the problems in fresh fish trade like unhygienic handling, spoilage due to lack of preservation, incorporation of unwanted chemicals and generation of waste at market place or at home while dressing the fish.



Shri Hibi Eden, MLA inaugurating Seafresh signature kiosk



Students performing the first sale in front of St. Albert's College, Ernakulam

Tribal Sub Plan Programmes at Venkatapuram, Andhra Pradesh

A Tribal Sub Plan Programme was organized by Visakhapatnam Research Centre of CIFT at Venkatapuram, a remote fishing hamlet adjoining Tandava Reservoir, Visakhapatnam district on 18 February, 2014.

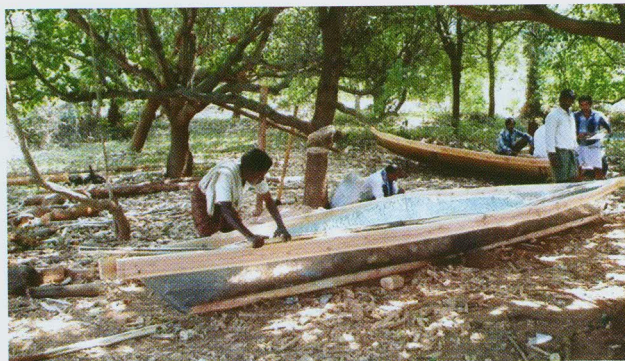
Tandava reservoir comes under medium reservoir category with a water spread area of 1689 hectares. There are 14 villages around the reservoir with 500 registered fisherfolk who depend mainly on fisheries for their livelihood. Venkatapuram fishing village has 20 fisher folk who are engaged in full time fishing activities. Fishing in the reservoir is mainly done with the help of wooden crafts ("Nooluga" wood) with tin sheets inside. The cost of the craft is around ₹ 8000/-. The duration of the wood is only three years and later it has to be changed. Gillnets with

different mesh sizes (120mm, 140mm, 160mm) are being used for harvesting fish. Crew size per craft is two. Fishing nets are set in the reservoir at 3 AM and fish will be harvested between 6 AM to 9 AM in the morning. A uniform harvesting time is being maintained by all the fishermen which is decided by the village head. Any deviation from the stipulated harvesting time is liable for punishment. Shrimp seeds are being stocked by some private people in the reservoir and the harvested shrimp will be sold to the same person at a rate of ₹ 130/-. Other fishes (Indian Major Carps etc.) are being sold at a rate of ₹ 70/- per Kg.

During the tribal sub plan programme, FRP coracles, foldable fish traps and gillnets were distributed to selected beneficiaries. Dr. M.M. Prasad, Principal Scientist & SIC



Construction of crafts in the village



of the Centre addressed the gathering regarding the activities of CIFT for welfare of fishers and the purpose of the tribal sub plan programmes implemented by Government of India. Dr. G. Rajeswari, Principal Scientist and Dr. R. Raghu Pradesh, Senior Scientist explained about



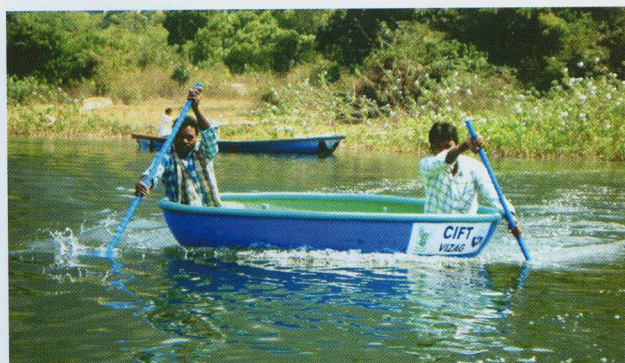
Dr. M.M. Prasad addressing the fisherfolk

the FRP coracles and foldable fish traps in reservoir fisheries and they urged the fishermen for proper use of the given resources. Smt. Arathy Ashok, Scientist collected data from the fishermen regarding their socio-economic condition. Shri John Prabhu Dasu, Assistant Director, Department of Fisheries Narasipatnam and Smt. Nirmala Kumari, FDO, State Fisheries Department were also present during the programme. After the programme demonstrations were conducted in the reservoir in the use of FRP coracles. Fishermen were very comfortable in using the FRP coracles. Finally Shri Prabu Dasu proposed vote of thanks.

Field visit into the reservoir revealed that there is vast potential for development of cage culture as is practiced in Chandil of Jharkhand. Implementation of Chandil like cage culture can make significant difference in the lives of fishers in this region.



Handing over of FRP coracles to the tribal fisherfolk

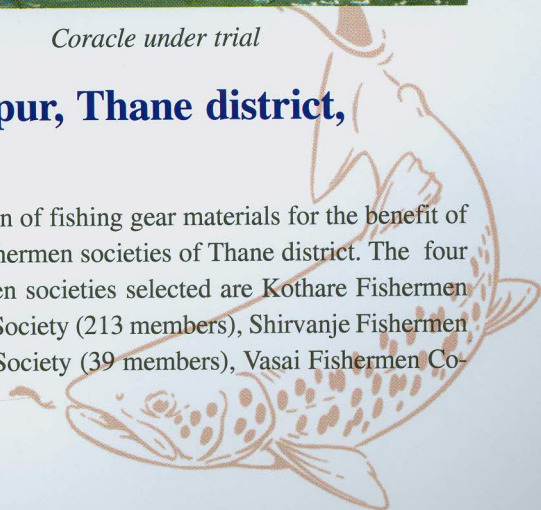


Coracle under trial

Tribal Sub Plan Programme at Shahapur, Thane district, Maharashtra

As a part of implementation of Tribal Sub Plan (TSP) of CIFT for the betterment of tribal communities in Maharashtra state, a TSP programme was organized at Shahapur, an inland fishing village in Thane district on 21 February, 2014. The programme was conducted for training

and distribution of fishing gear materials for the benefit of four tribal fishermen societies of Thane district. The four tribal fishermen societies selected are Kothare Fishermen Co-operative Society (213 members), Shirvanje Fishermen Co-operative Society (39 members), Vasai Fishermen Co-





Dr. S. Balasubramaniam addressing the fisherfolk

operative Society (79 members) and Usgaon Fishermen Co-operative Society (109 members). Fishing in the reservoir is mainly done with the help of inflated rubber tubes operated by a single person. Floating gillnets of different dimensions and mesh sizes (20-100 mm and 1.5 -3.4 feet depth) are used for fishing. Traditional floats made of bamboo and sinkers made of clay are used for maintaining the depth of operation of the gillnets. The harvested fishes using this gillnets includes major carps, catfishes, etc. The duration of fishing is from 06.00 to 09.00 hrs in the morning and the catches are collected together and sold in the local markets. The major carps are sold @ ₹ 70/- per Kg. in the local markets. All the fishermen are under the control of the Chairman of the respective societies.

The programme started with the welcome speech by Dr. S. Visnuvinayagam, Scientist & SIC, MRC of CIFT. Dr. S. Balasubramaniam, HOD, EIS Division & Nodal Officer (TSP), CIFT, Cochin detailed the various technology transfer programmes undertaken by CIFT under the TSP component in his presidential address. Shri Anil Kumar, Administrative Officer, CIFT, Cochin explained the purpose of TSP activities of Govt. of India and its benefits.

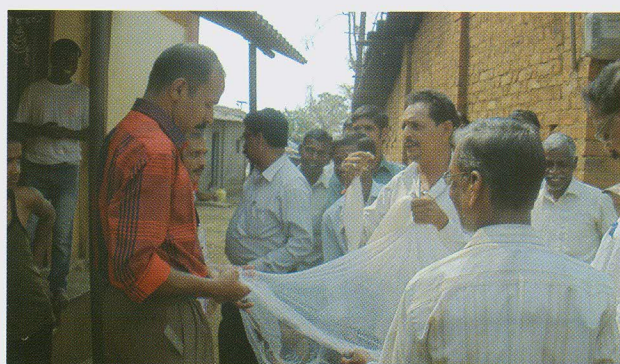
During the programme, monofilament and multifilament nylon gillnets of different mesh sizes and dimensions, nylon twine, ropes, floats, sinkers and weighing balances were distributed to selected beneficiaries. The quantities of each item distributed to each society were determined as per the number of fishermen in the respective society. Shri Vaydha, Assistant Commissioner of Fisheries, Department of Fisheries, Maharashtra also addressed the



Dr. S. Visnuvinayagam handing over fishing gear materials

gathering and he urged the fishermen for proper and effective use of the resources. Finally Smt. Priyanka Vichare, Technical Assistant, MRC of CIFT proposed vote of thanks. Smt. P. Viji, Scientist, MRC of CIFT collected data regarding the gear materials and accessories used by the fishermen for fishing activities. Shri Sanjay Patil, Field Officer, Department of Fisheries, Maharashtra was also present during the Tribal Sub Plan programme.

After the inaugural programme, Shri Arvind S. Kalangutkar, Tech. Officer, CIFT, Cochin gave a training on mending of the gillnets. Smt. P. Viji detailed the different value added products that could be prepared from the fishes harvested from the reservoir. However, the fishermen raised concern about the marketing of value added products like cutlets, balls, burgers etc. as they have to travel long distances to sell out the products. The products like dried fish, masala dried fish, pickle etc. were found suitable for the convenience of marketing and training on the preparation of such products were offered as per their interest.



Shri Aravind S. Kalangutkar imparting training on gillnets

Tribal Sub Plan Programmes at Jagadapur, Chattisgarh

Visakhapatnam Research Centre of CIFT conducted a three day Training cum Demonstration Programme under Tribal Sub Plan, at Jagadapur in Chattisgarh during 4-6

March, 2014. During the programme, training cum demonstration sessions were conducted on use of coracles, foldable fish traps, gillnets and preparation of value added

products from fishes. Fifty tribal beneficiaries belonging to different cooperative societies attended the programme. Beneficiaries included members of two fishermen cooperative societies associated with fishing in Kosateda reservoir in Bastar district, Chattisgarh and members of tribal women cooperative society 'Pradhamic Adivasi Machvaar Mahila Sahakari Samiti Maryadit Kurandi'. The programme was arranged in collaboration with the Department of Fisheries, Government of Chattisgarh.

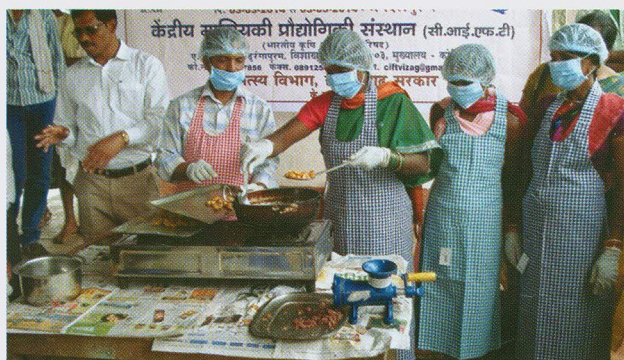
The programme was conducted at Balenga Fish farm, Jagadalpur. Training on harvest technology included lectures on responsible and selective fishing practices for reservoir and inland water bodies. Practical demonstrations were given on operation of gillnets, foldable fish traps and coracles. Dr. G. Rajeswari, Principal Scientist and Dr. R. Raghu Prakash, Senior Scientist explained about the need for conservation of resources and the importance of the responsible fishing technological practices. The post harvest training schedules covered aspects of hygienic handling of fish and preparation of value added products such as fish

pickles, fish cutlets, fish pakoda, fish wafer etc. In the post harvest demonstration session, use of insulated ice bags, ice boxes, meat mincers, heat sealers and wafer steamer were explained to the beneficiaries. Smt. Arathy Ashok, Scientist interacted with the participants and collected data on the socio-economic status of fisherfolk, fishing systems employed in reservoir fisheries, fish farming and marketing at Jagadalpur. Shri A.K. Panigrahi and Shri D. Rout, Tech. Officers and Shri G. Bhushanam, Tech. Assistant were involved in conducting the demonstration sessions on fish harvest and post harvest aspects.

Many of the technologies were new for the tribal fisher folks and they have expressed high satisfaction during the feedback session. The State Department officials Shri Nag (Deputy Director Fisheries, Raipur) and Shri Sanjay Padhi (Assistant Fisheries Officer, Jagadalpur) showed their interest in future collaboration with CIFT in conducting different programmes for the welfare of tribal fisherfolk in Chattisgarh.



Distribution of assets to beneficiaries



Demonstration on value added fish products

Tribal Sub Plan Programmes at Jeenabadu and Konam Villages of Visakhapatnam District, Andhra Pradesh

As part of the Tribal Sub Plan training programme, FRP coracles were distributed to scheduled tribe fishermen. The schedule tribe fisher villages were identified with the help of State Fisheries Department, Andhra Pradesh. Dr. M.M. Prasad, SIC, Dr. R. Raghu Prakash and Dr. B. Madhusudana Rao, Senior Scientists, Visakhapatnam Research Centre of CIFT conducted the programme. Shri Prabhu Das, Assistant Director, State Fisheries Department, Andhra Pradesh coordinated the programme.

At Jeenabadu Fishing Village, Raiwada Reservoir, Visakhapatnam District, Andhra Pradesh: Two FRP coracles were distributed to the fishermen society of

Jeenabadu fishing village. All the members of the society were tribal fishers whose livelihood depended entirely on the Raiwada Reservoir. The State Fisheries Department has stocked the Raiwada Reservoir with 7,95,000 fingerlings of rohu, catla and grass carp. Training cum demonstration programme was conducted on 13 March, 2014 wherein the fishermen of the Society were trained in using the coracles in the Raiwada Reservoir and the fishers ventured into the reservoir using the coracles. The fishermen were satisfied with the performance of the FRP coracles. Earlier the fishermen were using bamboo traps for catching prawns. The role of responsible fisheries technologies in resource conservation and the role of fishing technological



*Resource persons with ST fishers at Jeenabadu village,
Rewada Reservoir*

interventions for improving the inland fishing methods and thereby enhancing and improving the livelihood of fishers were explained to the participants. The advantages of foldable traps developed by CIFT when compared to bamboo traps (mainly durability and ability to carry more traps by single fishermen) was explained to the fishers. Foldable traps would be given to the fishermen for user trials. The role of hygienic handling and value added products for income was emphasized during the post harvest session.

The fishermen expressed their desire for FRP boats so that they can easily move through vegetation in the reservoir. The fisherfolk also expressed the need for ice boxes for transportation of fishes to the nearest market to enable them to realize better market value. Twenty fishermen participated



*Resource persons with ST fishers at Konam village,
Sri Vechalapu Palavelli Reservoir*

in the programme.

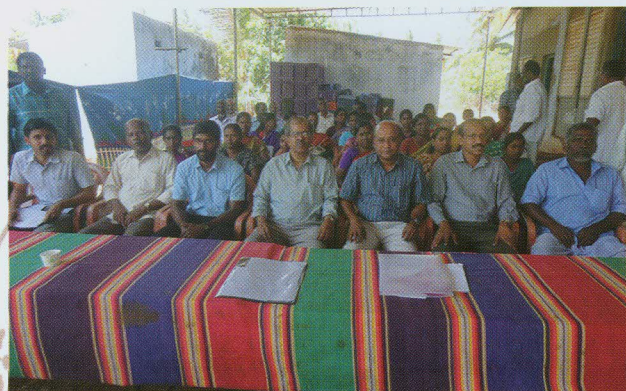
At Konam Village, Sri Vechalapu Palavelli Reservoir, Visakhapatnam District, Andhra Pradesh:

Two FRP coracles were distributed to the fishermen of Konam village. The fishermen catch fish from the Sri Vechalapu Palavelli Reservoir. A programme was conducted on 13 March, 2014 to demonstrate the use of coracles. The fishermen actively participated in the programme and had ventured in to the reservoir using the coracles. The fishermen were satisfied with the performance of the FRP coracles. The fishermen of this reservoir area were not using traps. The fishermen expressed their desire for more FRP coracles and FRP boats. Forty three fishermen participated in the programme.

Tribal Sub Plan Programme at Meenkara, Palakkad

In collaboration with Meenkara SC/ST Reservoir Fishermen Cooperative Society, technology transfer programmes were conducted during 27-29 March, 2014. The inaugural programme was presided by Shri C. Kunju, President, SC/ST Reservoir Fishermen Cooperative Society, Meenkara. The programme was inaugurated by Dr. S.

Balasubramaniam, HOD, EIS, CIFT, Cochin and Nodal Officer, TSP. Shri S. Mahesh, Deputy Director, Department of Fisheries, Malampuzha offered the Key Note address. Dr. M.P. Remesan, Principal Scientist, CIFT, Cochin, Shri Saji M. Rajesh, ADF, Malampuzha, Shri P.S. Shenoob, Ex-Officio Secretary & SI (Fisheries), Meenkara SC/ST



Participants and resource persons



Training on 'Value added fishery products'

Cooperative Society and Shri K. Kanakadas, Ex-President, SC/ST Cooperative Society were the dignitaries who addressed the participants during the function.

The training on 'Responsible fishing methods' was conducted on 27 March, 2014 by Dr. M.P. Remesan and Shri Aravind S. Kalangutkar, Tech. Officer, CIFT, Cochin. Forty trainees attended the training. Besides the training, 125 kg fishing net materials were provided to the participants so as to improve their daily fish catch, and

income under TSP component. The training on 'Hygienic fish handling and value added fishery products' was organized during 28-29 March, 2014. Dr. J. Bindu, Senior Scientist and Dr. A. Jeyakumari, Scientist, Shri K. Dinesh Prabhu and Shri V.T. Sadanandan, Jr. Lab Assts., CIFT, Cochin conducted the training for the 40 trainees. During the training, the preparation of fish pickles, fish fingers, fish balls, fish cutlets, prawn chutney powder and dried fish was explained and demonstrated to the participants.

CIFT participates in *Spandana - Girijanotsavamulu*, 2014

The Visakhapatnam Research Centre of CIFT has participated in the *Spandana - Girijanotsavamulu 2014* at Parvatipuram, Vizianagaram district, Andhra Pradesh on 23 February, 2014. The programme was organized by ITDA, Parvatipuram in collaboration with Agriculture and other line departments in Vizianagaram district. The programme was organized for the scheduled tribe people in the district and during the programme different assets have been distributed for the welfare of the people. Shri V. Kishore Chandra Deo, Hon'ble Union Cabinet Minister of Tribal Affairs and Panchayatiraj, Govt. of India and Shri Kantilal Dande, IAS, District Collector, Vizianagaram were present in the programme.

An exhibition stall was also put up by CIFT, Visakhapatnam showcasing different technologies developed which are useful for setting up of a small scale industry. More than 50,000 people visited the stalls. Visitors have shown keen interest to know in detail about different technologies

developed by the Institute for the welfare of fishers. Dr. M.M. Prasad, Principal Scientist and SIC, Dr. G. Rajeswari, Principal Scientist, Smt. Arathy Ashok and Kum. Jesmi Debbarma, Scientists represented CIFT during the programme. Shri G. Bhushanam, Technician and Shri S. Ganik, SSS assisted in setting up CIFT stall during the exhibition.

As a part of TSP inputs were distributed for selected beneficiaries belonging to scheduled tribe category. The assets were handed over to the tribal fishers by Hon'ble Minister Shri V. Kishore Chandra Deo. Shri Kantilal Dande, IAS, District Collector of Vizianagaram handed over the FRP coracles to the selected beneficiaries. In this context, the District Collector has appreciated the role of CIFT, Visakhapatnam in developing of new technologies and implementation of the same at grassroots level for the benefit of fishers in general and ST fishers in particular.



Hundreds of visitors throng to CIFT stall



Shri Kantilal Dande, IAS distributing the CIFT TSP inputs to the beneficiaries

Medical cum Awareness Camp for Stakeholders

CIFT, Cochin jointly with District Government Hospital, Kasaragod, organized a free medical cum awareness camp during 18-19 March, 2014 at Valiya-

paramba Panchayath Office, for the stakeholders at Valiyaparamba in Kasaragod district under the DST supported project entitled "Food safety interventions for



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Hundreds of visitors throng to CIFT stall

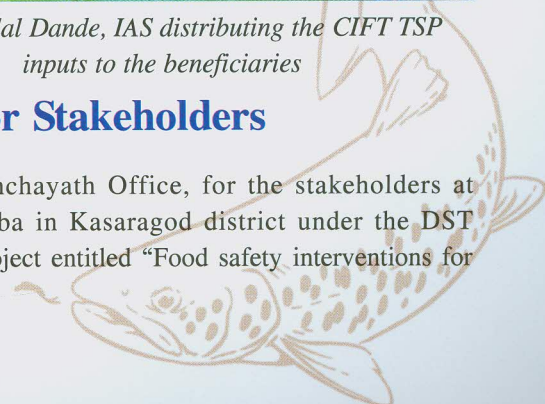


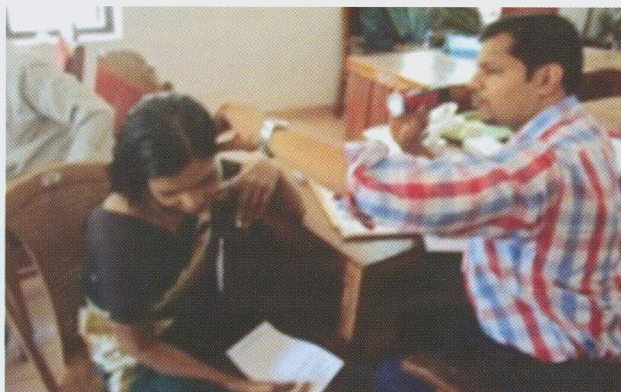
Shri Kantilal Dande, IAS distributing the CIFT TSP inputs to the beneficiaries

Medical cum Awareness Camp for Stakeholders

CIFT, Cochin jointly with District Government Hospital, Kasaragod, organized a free medical cum awareness camp during 18-19 March, 2014 at Valiya-

paramba Panchayath Office, for the stakeholders at Valiyaparamba in Kasaragod district under the DST supported project entitled "Food safety interventions for





Medical team examining the stakeholders



women in fishery based microenterprises in coastal Kerala". The main objective of the camp was to bring affordable healthcare and free health information to the beneficiaries and identifying the common health problems of the fishery women.

A total of 72 people were benefitted by the Camp. Out of this 48 were found to be normal, without any major health problems. Medical team from Kasaragod District Government Hospital examined the people. Majority of cases reported were related to vision problems. The patients who need further treatment were referred to Kasaragod

District Hospital. Free medicines were provided and free medical tests were conducted. Health cards were also issued to the stakeholders.

Proper and adequate awareness classes are absolutely essential for safe handling of food and thus to prevent food-borne diseases. On 19 March an awareness class on Good Personnel Policy (GPP) was conducted for the stakeholders. Speaking on the occasion Dr. Femeena Hassan, PI of the Project said that good personnel hygiene policies and practices are the foundation for successful food safety and quality assurance in all food manufacturing facilities.

Consultancy Agreements Signed

During the period under report CIFT, Cochin signed the following consultancy agreements:

- i. **With M/s Lombardini India Pvt. Ltd., Aurangabad** for providing the validation service and certification of the diesel engines manufactured by the party at a consultancy charges of ₹ 1,11,250/- + 12.36% service tax.
- ii. **With M/s Travancore Aquapets, Kumbalam P.O., Cochin** for providing the technical guidance and

assistance relating to the production of Lipstick using squid chromatophore as colourant at a consultancy charges of ₹ 65,731/- + 12.36% service tax.

- iii. **With St. George College, Aruvithura P.O., Kottayam** for providing technical advice and assistance relating to setting up of a food testing laboratory with NABL accreditation status at a consultancy charges ₹ 2,75,000/- + 12.36% service tax.

Deputation Abroad

Dr. R. Anandan, Senior Scientist, CIFT, Cochin was deputed by ICAR, New Delhi for 3-months (21 October, 2013 to 17 January, 2014) under National Agricultural Innovative Project to undergo foreign training in the area of nutraceuticals (Fisheries Sciences) in the Department of Medicine (Cardiology), Biochemistry and Molecular Biology, Gazes Cardiac Research Institute, Medical University of South Carolina, Charleston, SC, USA. He has studied the "Nutritional influence of n-3 PUFA in modulating the hypertrophy mechanisms of myocytes"

under the guidance of Professor Donald R. Menick, Director, Department of Medicine, Division of Cardiology, MUSC. Additionally he got exposure to the compliance issues that regulate laboratory research programmes.

Cardiovascular diseases form a major health concern in recent years, causing severe illness and death throughout the world. A considerable body of clinical and experimental evidence is now emerging which suggests that β -adrenergic receptor activation is common during times of cardiac stress leading to increases in heart rate and contractility





Dr. Anandan in the laboratory

contributing to increased cardiac output. Epidemiological studies (Das, 2000; Pedersen *et al.*, 1999) have revealed that Greenland Eskimos and Japanese with diets rich in fish oil show low incidence of ischemic heart disease as compared with European and North American populations. It is hypothesized that the n-3 polyunsaturated fatty acids, eicosapentaenoic acid (EPA, C20:5n-3) and docosahexaenoic acid (DHA, C22:6n-3) present in substantial quantities in Mediterranean diet are the active components responsible for this beneficial effect (Jude *et al.*, 2006). In the present training programme, an attempt has been made to examine the nutritional influence of n-3 PUFA in modulating the hypertrophy mechanisms of myocytes. *In vivo* and *in vitro* experimental studies were carried out to understand the regulatory mechanisms involved in the protective effect of n-3 PUFA on α -adrenergic receptor and β -adrenergic receptor-stimulated Nc1 upregulation in cardiomyocytes. It is observed that supplementation of n-3 PUFA rich in EPA and DHA are exerting cardioprotective effect mostly through activation of protective protein kinases. Interestingly, the n-3 PUFA were found to enhance the expression of antioxidant defense enzymes such as superoxide dismutase and catalase in adult cardiomyocytes. Histochemical investigation carried out also confirmed the protective effects of n-3 PUFA in maintaining the structural integrity of cardiomyocytes during cardiac hypertrophy. It is also noticed that n-3 PUFA supplementation can increase cardiomyocyte cell viability during hypoxic conditions. Technical expertise in the following area was acquired during the training programme:

1. Cardiomyocyte isolation from intact rat and mouse hearts.
2. Confocal microscopy, specimen preparation and *immunofluorescent imaging strategies*.
3. Western assay and image digitization and analysis.
4. Murine cardiac surgery and echocardiography.

5. Protein chemistry and molecular biology.

Dr. G.K. Sivaraman, Senior Scientist, Veraval Research Centre of CIFT has undergone NAIP sponsored International Training Programme on Bioinformatics (Fisheries) using Bionumerics mathematical model system to type the seafood-borne bacterial pathogens by Pulse Field Gel Electrophoresis (PFGE) and Multi-Locus Sequence Typing (MLST) under the supervision of Dr. Siddhartha Thakur, Associate Professor, Department of Population Health and Pathobiology, College of Veterinary Medicine, North Carolina State University, USA during 21 October, 2013 to 20 January, 2014. The gained knowledge on bioinformatic tools is expected to help in designing experiments for typing and identification of gene responsible for virulence/pathogenicity and antimicrobial resistance of pathogens of seafood-borne bacterial pathogens.



Dr. P. Muhamed Ashraf, Senior Scientist, CIFT, Cochin attended the Nippon Foundation – Partnership of Observation in Global Oceans (NF-POGO) training on Detection of HABs (harmful algal blooms) in southeast Asia by remote sensing: Operational warning and regional monitoring protocols at Marine Science Laboratory, University of the Philippines, Bolinao, Pangasinan, Philippines during 24 February-15 March, 2014. The objective of the training was to learn the biological, physical and chemical characteristics of HABs and technologies for early warning system development. The training comprised of biological oceanography of HAB, chemical and physical characteristics of environment, which was favourable for blooms and cyst developments, ecology of HABs and the methods for developing early warning systems. The training included remote sensing data acquisition from MODIS and Merris satellites using Giovanni, Ocean watch LAS and



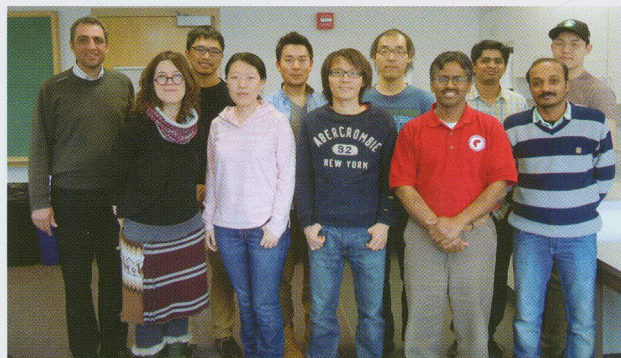
Dr. Muhamed Ashraf in front of Marine Science Laboratory





data processing by using BEAM, DELFT 3D and Ocean Data View softwares. Hands on training was acquired on different oceanographic instruments, analysis and sampling procedures. At the end of the training a group project on “Comparative evaluation of HAB situations in coastal waters of India and bays of Philippines” was done by Dr. Ashraf and other participants. They compared the *in situ* data of recent phytoplankton blooms in Indian coastal waters and Philippines and discussed about the species composition and physico-chemical characteristics of water of the two countries. The wind pattern, geography, anthropogenic characteristics and intensive marine aquaculture have influenced more harmful algal bloom incidents in Philippines than India. The training was organized in an excellent manner with lots of theory and hands on training which helped Dr. Ashraf to learn about the HAB environment and mitigating measures. The coordinator of the training was Dr. Aletta T. Ynigues, Associate Professor, Marine Science Institute, University of the Philippines, Philippines. A total of 24 participants attended the training from Philippines, Malaysia, Thailand, Indonesia, Vietnam and India.

Dr. C.O. Mohan, Scientist, CIFT, Cochin was deputed by ICAR, New Delhi for undergoing 90 days International Training to undertake a short term project work in the field of “Sensor based applications including bio-indicators”. He carried out the work under the guidance of Prof. Sundaram Gunasekaran, Biological Systems Engineering Department, University of Wisconsin-Madison, USA during 22 December, 2013 to 21 March, 2014. Dr. Mohan worked on the development of Time-Temperature Indicators (TTIs) for monitoring the temperature abuse of frozen stored foods. For frozen food products, proper temperature (-18°C) has

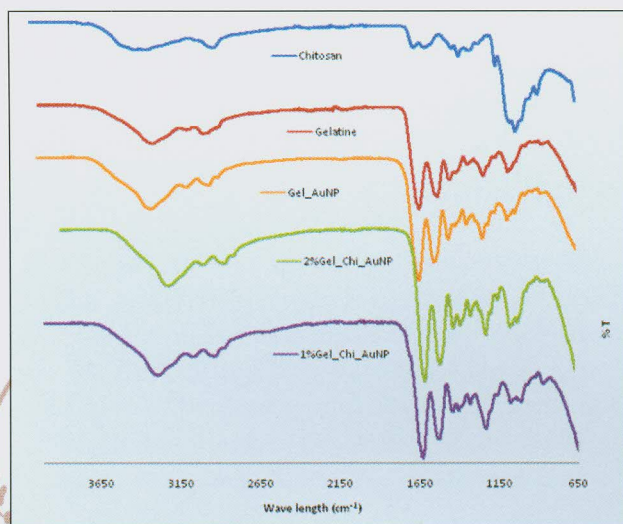


Dr. Mohan (extreme right) with Prof. Sundaram Gunasekaran and other colleagues

to be strictly maintained throughout the supply chain till the product reaches the consumers. Any deviation may result in the rejection of food consignments leading to economic loss. A visible temperature abuse indicator will be useful for maintaining the proper storage conditions at all the stages. Gold nanoparticles (AuNP) due to its brilliant colour and unique properties are highly suitable for biosensor applications. During this short term training programme, Dr. Mohan learned various techniques of synthesizing nanoparticles and its characterization using UV Visible spectrophotometer, Particle size analyzer, FTIR and SEM. During the period, he standardized a greener method for the synthesis of AuNP which can be used as Time-Temperature Indicators (TTIs).

He used chitosan as a reducing and stabilizing agent for the AuNP synthesis. Very low level of chitosan (0.1%) was sufficient to synthesis AuNP. However higher chitosan concentration (0.25%) resulted in smaller AuNP for the same heating temperature and time. The time dependent stability of chitosan-AuNP indicated that particles were stable for one month duration under frozen storage conditions (-18°C). Studies on the FTIR spectrum indicated the presence and deposition of chitosan onto gold nanoparticles. The lower levels of chitosan (0.0625 and 0.125%) used for AuNP synthesis did not show any colour differentiation upon temperature abuse from 10 min. to 24 h, whereas 0.25% chitosan-AuNP gave visible colour differentiation indicating its suitability as TTIs for frozen applications. The effect of gelatin alone and in combination with chitosan on the particle size of AuNP and its application as TTIs for frozen application was also studied. Use of gelatin alone (2%) resulted in smaller AuNP (23.9nm) compared to gelatin and chitosan combinations (39.5 to 51.4 nm). The concentration of gelatin-chitosan used during the study for synthesizing AuNP did not gave promising results necessitating further studies.

Dr. P.K. Binsi, Scientist, Mumbai Research Centre of CIFT was deputed to USA to undergo advanced training



FTIR spectra of chitosan and gelatin capped gold nanoparticles for developing TTIs



on 'Smart packaging' at Rutgers-The State University of New Jersey under the financial assistance of NAIP. The training programme was carried out under the guidance of Dr. Kit L. Yam, Professor and Undergraduate Programme Director, Department of Food Science, Rutgers University for a period of two months during 1 February to 31 March, 2014. A part of the training programme was carried out at Eastern Regional Centre of United States Department of Agriculture (USDA), under the guidance of Dr. Annous Bassam. During her training at Rutgers, she has learned the concept of smart packaging techniques with emphasis on controlled release packaging system for fishery products.

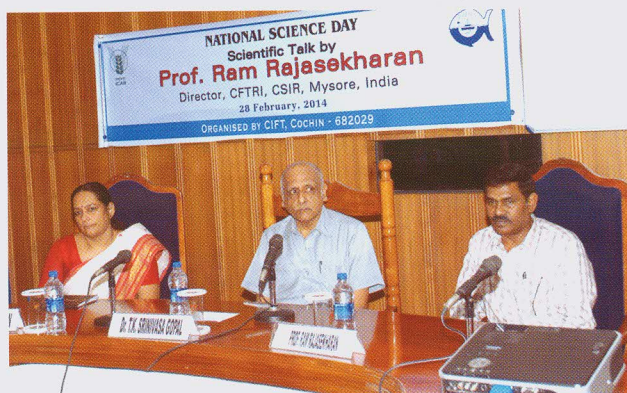


Prof. Kit L. Yam and Dr. Binsi

National Science Day Celebrated

Prof. Ram Rajasekharan, Director, CFTRI (CSIR), Mysore inaugurated the National Science Day celebrations at CIFT, Cochin on 28 February, 2014 and gave a lead talk on "Applaud-Aquatic Biofunctionals". He spoke on the importance of healthy oils containing omega-3 fatty acids. He stressed the importance of marine fish oil and how it helps in preventing heart diseases and related problems. He was

suggesting mechanisms of producing omega-3 fatty acids in plant oils for the benefit of vegetarians. He explained how the production of plant oils having omega-3 fatty acids can be increased by cultivating the plants giving chia oil, flax seed oil and osimum oil. In the diet omega-3/omega-6 ratio of oil used has to be confirmed for healthy usage of oil. The importance of nutraceuticals in the days to come will be remarkable, whether it is of fish or vegetable origin - he concluded.



Inaugural session in progress: On the dias are Dr. Suseela Mathew, Dr. T.K. Srinivasa Gopal and Prof. Ram Rajasekharan



Prof. Ram Rajasekharan delivering the talk

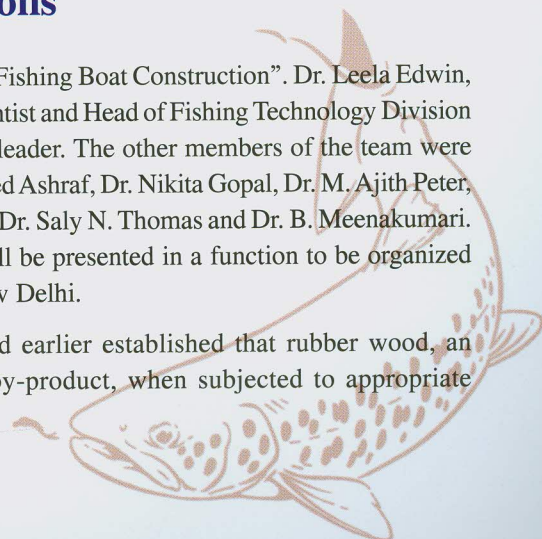
Awards and Recognitions

CIFT Team wins National Award for Technology Innovation

A communication received from the Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India states that a team of researchers from the CIFT, Cochin has been selected for the 4th National Award for Technology Innovation (Runner Up) in the field of Polymer Science & Technology for their work on "Upgradation of Treated Rubber Wood Using FRP

Sheathing for Fishing Boat Construction". Dr. Leela Edwin, Principal Scientist and Head of Fishing Technology Division was the team leader. The other members of the team were Dr. P. Muhamed Ashraf, Dr. Nikita Gopal, Dr. M. Ajith Peter, Dr. A. Sreeja, Dr. Saly N. Thomas and Dr. B. Meenakumari. The award will be presented in a function to be organized shortly in New Delhi.

CIFT had earlier established that rubber wood, an agricultural by-product, when subjected to appropriate





preservative treatments, is an alternative to conventional timbers for construction of small fishing canoes. The present innovation showed the effectiveness of Fibreglass Reinforced Plastic (FRP) sheathing in protecting the preserved rubber wood without any biological degradation and prevents the leaching of chemical constituents of the wood preservative into the aquatic environment. This was proved through studies conducted on the aquatic environment and the biota which established the eco-friendliness of the technology. Thus the FRP sheathing makes use of treated wood environmentally safe. The economic viability was acknowledged by the fishermen who carried out the extended field trials as the FRP sheathed rubber wood canoe were practically maintenance-free and had a life more than that of the conventional canoes.

VIP Visits

Seventeen IAS trainees from Lal Bahadur Shastri National Academy of Administration, Mussorie visited CIFT, Cochin on 6 February, 2014.

Radio Talks

During the period under report the following radio talks were delivered by Scientists and Officers of the Institute:

- i. **Dr. M.M. Prasad**, Principal Scientist and SIC, Visakhapatnam - "Role of marine protected areas in conservation of fishery resources", AIR, Visakhapatnam (20 February).
- ii. **Dr. M.S. Kumar**, Chief Tech. Officer - "Biodiversity and conservation of marine resources", AIR, Visakhapatnam (20 March).

Personnel News

Participation in Seminars/Symposia/Workshops etc.

- **Dr. T.K. Srinivasa Gopal**, Director – Annual conference of Vice Chancellors of Agricultural Universities and Directors of ICAR Institutes, Baramati, Maharashtra (18-20 January)
- **Dr. T.K. Srinivasa Gopal**, Director – Lab Research Council Meeting, DFRL, Mysore (1 February)
- **Dr. T.K. Srinivasa Gopal**, Director – Technical programme discussion meeting for review of the research projects pertaining to TSC-4, NRFCC, BRANS, BARC, Mumbai (19 February)

CIFT Staff bags laurels

Shri K.R. Rajasaravanan, SSS, CIFT, Cochin became the Winner of 29th S. Ramaswamy Memorial Kerala State Carom Championship held at Thiruvananthapuram during 8-10 February, 2014. Shri K.D. Santhosh, Tech. Assistant won the third position in Veterans (Singles) in the championship.

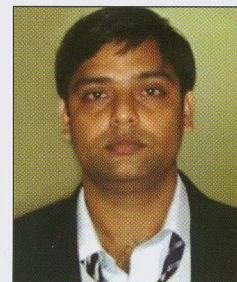


Shri Santhosh and Shri Rajasaravanan receiving the trophies

Post Graduate Studies

Ph.D. Awarded

Shri Ashish Kumar Jha, Scientist, Veraval Research Centre of CIFT has obtained his Ph.D. from Central Institute of Fisheries Education, Mumbai. He worked under the guidance of Dr. A.K. Pal, Scientist of CIFE. The topic of his Doctoral research was "Biochemical, molecular and cellular responses of *Labeo rohita* fingerlings to hypoxia".





Murthy, Senior Scientist, Dr. A.K. Jha, Dr. K.K. Prajith, Smt. S. Remya and Smt. V. Renuka, Scientists, – National conference on Emerging safety and technological issues in seafood industry, Veraval (14-15 March)

- ❑ **Dr. T.K. Srinivasa Gopal, Director, Dr. Nikita Gopal, Principal Scientist and Shri P.J. Davis, SAO** – XII Plan meeting, ICAR, New Delhi (30 January)
- ❑ **Dr. Leela Edwin, HOD, FT** – Fourth meeting of Expert committee for comprehensive review of deep-sea fishing policy and guidelines, ICAR, New Delhi (13 March)
- ❑ **Dr. Leela Edwin, HOD, FT** – Meeting of the Committee for selection of Group 'B' Officers, MPEDA, Cochin (27 March)
- ❑ **Dr. K.V. Lalitha, HOD, MFB** – 6th Annual Workshop of NAIP, Component 2, New Delhi (21-23 February)
- ❑ **Dr. T.V. Sankar, HOD, QAM** – Faculty improvement programme, UGC-Academic Staff College, University of Kerala, Thiruvananthapuram (16 January) (As resource person)
- ❑ **Dr. T.V. Sankar, HOD, QAM** – 43rd meeting of Institute Management Committee, CIBA, Chennai (31 January)
- ❑ **Dr. T.V. Sankar, HOD, QAM, Dr. K. Ashok Kumar, Principal Scientist and Dr. S.K. Panda, Senior Scientist** – Meeting of the Scientific panel of Food Safety Standards Authority of India, New Delhi at CIFT, Cochin (23-24 January)
- ❑ **Dr. C.N. Ravishankar, HOD, FP** – Annual review workshop of ITMU, ZTMC and Business Incubation Centres, ICAR, New Delhi (6-8 March)
- ❑ **Dr. C.N. Ravishankar, HOD, FP** – Workshop on Challenges and opportunities in intellectual property management and commercialization of technologies in fisheries and agriculture sectors, NBFGR, Lucknow (20 March). Dr. Ravishankar also delivered a talk on "IP and TM – ICAR initiatives" in the Workshop.
- ❑ **Dr. M.M. Prasad, SIC, Visakhapatnam** – Mid term review meeting of ICAR Regional Committee No. II, CIFRI, Barrackpore (24 January)
- ❑ **Dr. M.M. Prasad, SIC, Visakhapatnam** – National conference on Mitigation and adaptation strategies in wetlands: A community leadership perspective, CIFRI, Barrackpore (1-2 March). Dr. Prasad made a

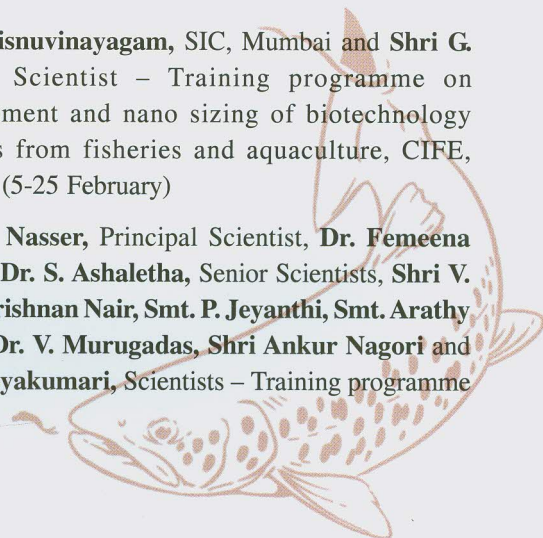
presentation on "Conservation and utilization of resources in bio-super markets (wetlands) with special reference to Andhra Pradesh" in the Conference.

- ❑ **Dr. M.M. Prasad, SIC, Visakhapatnam** – State level workshop on Fisheries – Impact on their livelihoods, Visakhapatnam (27 March). As the Chief Guest Dr. Prasad delivered a talk on "Poverty alleviation in small scale fisheries with special reference to women fishers of Andhra Pradesh" in the Workshop.
- ❑ **Dr. M.M. Prasad, SIC, Visakhapatnam and Dr. G. Rajeswari, Principal Scientist** – Workshop on Fish conservation, Visakhapatnam (24 February). Dr. Prasad as the Chief Guest delivered a talk on "Conservation of marine resources through marine protected areas" while Dr. Rajeswari delivered a talk on "Fishing gears for fishery resource conservation" in the Workshop.
- ❑ **Dr. M.M. Prasad, SIC, Visakhapatnam and Kum. Jesmi Debbarma, Scientist** – Consultation workshop on Self-sufficient and sustainable aquaculture in north eastern region, Agarthala (5 February). Dr. Prasad also made a presentation on "Roadmap for development of harvest and post harvest fisheries in north eastern states" in the Workshop.



Dr. Prasad making the presentation

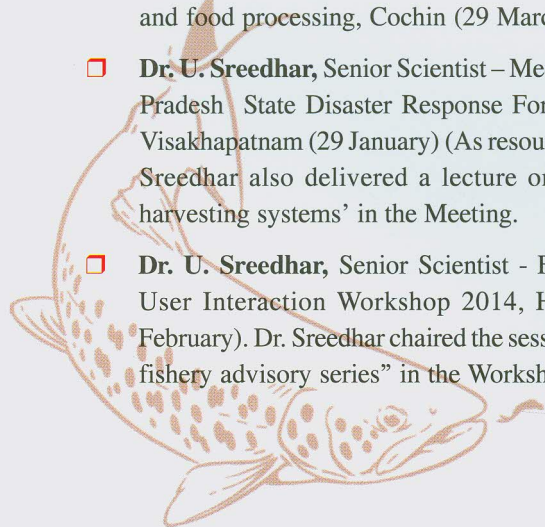
- ❑ **Dr. S. Visnuvinayagam, SIC, Mumbai and Shri G. Kamei, Scientist** – Training programme on Development and nano sizing of biotechnology products from fisheries and aquaculture, CIFE, Mumbai (5-25 February)
- ❑ **Shri M. Nasser, Principal Scientist, Dr. Femeena Hassan, Dr. S. Ashaletha, Senior Scientists, Shri V. Radhakrishnan Nair, Smt. P. Jeyanthi, Smt. Arathy Ashok, Dr. V. Murugadas, Shri Ankur Nagori and Dr. A. Jeyakumari, Scientists** – Training programme





on Data analysis using SAS, CIFT, Cochin (1-7 February)

- ❑ **Dr. Saly N. Thomas**, Principal Scientist – Meeting of the committee set up for ‘Implementation of net factory at Trivandrum’, Cochin (21 January)
- ❑ **Dr. Saly N. Thomas**, Principal Scientist – International conference on Advanced technology for ballast water and biofouling, Chennai (4-7 March)
- ❑ **Dr. Saly N. Thomas**, Principal Scientist – Meeting of the Expert committee to study farming of variety fishes in Kerala, KUFOS, Cochin (15 March)
- ❑ **Dr. P. Pravin**, Principal Scientist – Meeting to review the Action taken report on the recommendations of the XXIII meeting of the ICAR Regional Committee No. VIII, CTCRI, Thiruvananthapuram (7 March)
- ❑ **Dr. George Ninan**, Senior Scientist – National student conference on Food technology, IICPT, Thanjavur (7 February). Dr. George Ninan also delivered a talk on “Value addition in fish processing sector” in the Conference.
- ❑ **Dr. George Ninan**, Senior Scientist – Clinic on Agro marine food processing, DIC, Alappuzha (13 February). Dr. George Ninan also delivered a talk on “Technologies for commercialization in fisheries harvest and post harvest sector” in the Clinic.
- ❑ **Dr. George Ninan**, Senior Scientist – Refresher course on Food science and technology, DFRL, Mysore (20 February) (As resource person). Dr. George Ninan also delivered a talk on “Recent trends in seafood processing and packaging” in the Course.
- ❑ **Dr. A.A. Zynudheen**, Senior Scientist, **Dr. C.O. Mohan**, **Dr. V. Ronda**, Scientists, **Shri C.R. Gokulan**, Asst. Chief Tech. Officer and **Shri Nitin Singh**, Business Manager – Made in Kerala – Conference and exposition on Opportunities in value added agriculture and food processing, Cochin (29 March)
- ❑ **Dr. U. Sreedhar**, Senior Scientist – Meeting of Andhra Pradesh State Disaster Response Force (APSDRF), Visakhapatnam (29 January) (As resource person). Dr. Sreedhar also delivered a lecture on ‘Open water harvesting systems’ in the Meeting.
- ❑ **Dr. U. Sreedhar**, Senior Scientist - Fourth INCOIS User Interaction Workshop 2014, Hyderabad (25 February). Dr. Sreedhar chaired the session on “Marine fishery advisory series” in the Workshop.
- ❑ **Dr. U. Sreedhar**, Senior Scientist – Review meeting of the project sponsored by ESSO-INCOIS under the sub project Marine Fishery Advisory Services (MFAS), INCOIS, Hyderabad (19 March). Dr. Sreedhar also presented the progress of the ongoing project on “Validation of tuna advisories off east coast” in the Meeting.
- ❑ **Dr. U. Sreedhar**, Senior Scientist, **Dr. K.K. Prajith**, Scientist and **Kum. V.P. Souda**, JRF – Training programme on *In situ* sampling protocols for satellite coastal oceanographic research (SATCORE) and marine fisheries advisory services (MFAS), Andhra University, Visakhapatnam (2-5 March)
- ❑ **Dr. R. Anandan**, Senior Scientist - Training in the area of nutraceuticals (Fisheries Sciences) in the Department of Medicine (Cardiology), Biochemistry and Molecular Biology, Gages Cardiac Research Institute, Medical University of South Carolina, Charleston, USA (21 October, 2013 to 17 January, 2014)
- ❑ **Dr. P. Muhamed Ashraf**, Senior Scientist – Training programme on Detection of HABs in south east Asia by remote sensing: Operational warning and regional monitoring protocols, Marine Science Institute, Univ. of the Philippines, Bolinao (24 February – 15 March)
- ❑ **Dr. G.K. Sivaraman**, Senior Scientist – International training programme on Bioinformatics (Fisheries), College of Veterinary Medicine, North Carolina State University, USA (21 October, 2013 to 20 January, 2014)
- ❑ **Dr. J. Bindu**, Senior Scientist – National symposium on Sustainable polymers, IIT, Guwahati (6-11 January)
- ❑ **Dr. J. Bindu**, Senior Scientist – Terminal workshop of the Component-4 of NAIP projects, IARI, New Delhi (20 March)
- ❑ **Dr. Toms C. Joseph**, Senior Scientist – Training programme on Next generation sequencing: Data analysis and notation, IISR, Calicut (17-20 March)
- ❑ **Dr. B. Madhusudana Rao**, Senior Scientist – National workshop on Aquatic animal health and biodiversity, Andhra University, Visakhapatnam (29 March). Dr. Madhusudana Rao delivered a technical talk on “Human pathogens in the aquatic environment: Implications for food safety” in the Workshop.
- ❑ **Dr. L.N. Murthy**, Senior Scientist – Workshop on Post



harvest fisheries and fish by-products, SYNM College, Narsapur (1 March). Dr. Murthy gave a talk on “Value addition in fisheries and modern trends in fish packaging” in the Workshop.

- ❑ **Dr. V.R. Madhu**, Senior Scientist – Review committee meeting of INCOIS project, ‘Ecological linkages between plankton production and *Acetes* sp. abundance along Gujarat coast, INCOIS, Hyderabad (19 March)
- ❑ **Dr. C.O. Mohan**, Scientist - Training on Sensor based application including bio-indicators, University of Wisconsin Madison, USA (22 December, 2013 – 21 March, 2014)
- ❑ **Shri C.G. Joshy**, Scientist – Workshop on Internet Protocol Version 6, New Delhi (27 February – 1 March)
- ❑ **Dr. P.K. Binsi**, Scientist – Advanced training on Smart Packaging, Rutgers-The State University of New Jersey, USA (1 February - 31 March)
- ❑ **Smt. P. Viji**, Scientist – Seminar held in connection with ‘Fish Maha Festival’, Goa (31 January – 2 February). Smt. Viji also delivered a talk on “Value added products from fish and shellfish” in the Seminar.
- ❑ **Smt. P. Viji**, Scientist – Industry Day Meet, CIFE, Mumbai (28 February)
- ❑ **Smt. P. Viji**, Scientist, **Kum. Remyakumari**, JRF – National workshop cum training on High pressure processing for food preservation, CIFT, Cochin (7 March)
- ❑ **Dr. Niladri Sekhar Chatterjee**, Scientist – Research project proposal development workshop, NAARM, Hyderabad (20-22 March)
- ❑ **Dr. A.R.S. Menon**, Chief Tech. Officer - Inter Media Publicity Coordination Committee Meeting, AIR, Thiruvananthapuram (3 January)
- ❑ **Dr. A.R.S. Menon**, Chief Tech. Officer - Inter Media Publicity Coordination Committee Meeting, AIR,

Thiruvananthapuram (7 February)

- ❑ **Dr. M.S. Kumar**, Chief Tech. Officer – ‘Technology Week Celebrations’, KVK, Amdalavalasa, Srikakulam (23 January). Dr. Kumar delivered a talk on ‘Technologies developed at CIFT especially value added products for economic development of women fishers’ in the Meeting.
- ❑ **Dr. M.S. Kumar**, Chief Tech. Officer – Interface Coordination Committee Meeting of industrial and ICAR institutes, SAUs and Veterinary Universities, SMILDA, Hyderabad (14 February)
- ❑ **Dr. Santhosh Alex**, Sr. Tech. Officer – Hindi workshop, HPCL, Visakhapatnam (29 January) (As resource person)
- ❑ **Dr. Santhosh Alex**, Sr. Tech. Officer – Hindi workshop, MPEDA, Visakhapatnam (24 March) (As resource person)
- ❑ **Smt. T. Silaja**, Sr. Tech. Officer, **Shri P. Bhaskaran**, Sr. Tech. Asst., **Shri Eldho George** and **Shri Shaiph Mustafa**, SRFs – Koha professional training, TNAU, Coimbatore (27 February – 1 March)
- ❑ **Smt. G. Remani**, Tech. Officer and **Shri P. Suresh**, Technician – Seminar on Optimize your lab performance, Cochin (18 February)
- ❑ **Shri P.P. Anil Kumar**, AF&ACO – Workshop on Analysis of financial statements, ISTM, New Delhi (20-21 February)
- ❑ **Shri Shaiph Mustafa** and **Shri Eldho George**, SRFs – National workshop on Developing institutional repositories using DSpace, IISR, Calicut (12-13 March)
- ❑ **Kum. V.P. Souda**, JRF – Short course on Remote sensing of potential fishing zones and ocean state forecast, ITC Ocean, Hyderabad (24-29 March)
- ❑ **Kum. P. Minu**, JRF – INCOIS project review meeting, Andhra University, Visakhapatnam (17 March)

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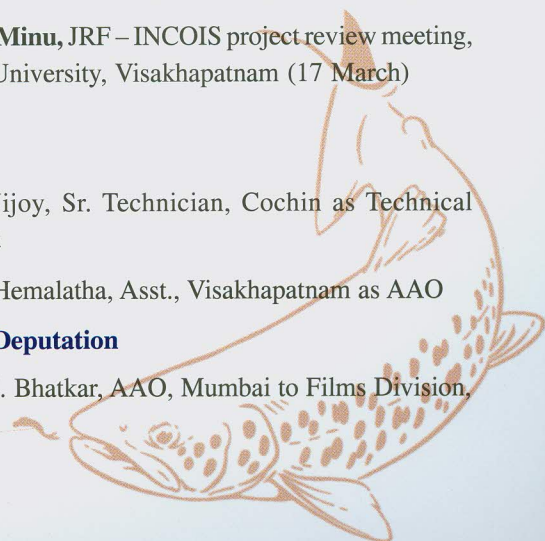
Promotions

1. Dr. V. Geethalakshmi, Senior Scientist, Cochin as Principal Scientist
2. Dr. Nikita Gopal, Senior Scientist, Cochin as Principal Scientist

3. Shri T. Jijoy, Sr. Technician, Cochin as Technical Assistant
4. Smt. B. Hemalatha, Asst., Visakhapatnam as AAO

Transfer on Deputation

1. Shri M.S. Bhatkar, AAO, Mumbai to Films Division,





Mumbai

Retirements

1. Dr. R. Badonia, Principal Scientist & SIC, Veraval
2. Smt. B. Hemalatha, AAO, Visakhapatnam
3. Shri C.D. Parameswaran, SSS, Cochin
4. Smt. Gangaben Naren Chorwadi, SSS, Veraval

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1. Fish packaging technology (edited by Dr. K. Gopakumar)	₹ 270.00	Concept Publishing Co., A 15-16, Commercial Block, Mohan Garden, New Delhi - 110 059
2. Tropical fishery Products - Dr. K. Gopakumar	₹ 70.00	Science Publishers Inc. P.O. Box - 699, Enfield, NH 03748, USA
3. Post harvest technology of fish and fishery products - Shri K.K. Balachandran	₹ 895.00	1. Education Book Suppliers, Convent Rd., Ernakulam 2. Daya Publishing House, 1123/74, Devaram Park, Trinagar, New Delhi - 110 035