

मत्स्य प्रौद्योगिकी समाचार Fish Technology Newsletter

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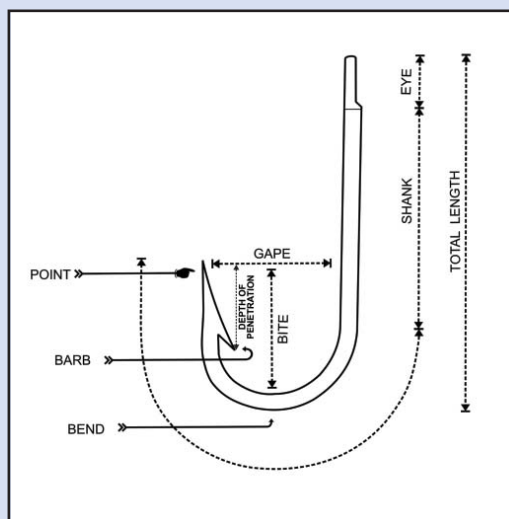
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News from the Research Front

A New Method for Evaluation of Sharpness of Fishing Hook

Fishing hook is a device which when baited entices the fish into swallowing it and once swallowed it ensures that it is impossible for the fish to escape. It usually penetrates into the mouth of the fish when the bait is taken or when the line is pulled. Shank, eye, gape, barb and point are the basic components of a fishing hook of which the point and barb respectively penetrates and holds the fish. Hook shape, size, breaking strength and sharpness of the point are important attributes responsible for the success of hooking.

Sharpness is very important as a sharp point penetrates easily a fish jaw/mouth during hooking. Made of high carbon steel, on use especially in sea water the hook point loses sharpness and becomes blunt. Corrosion as well as rubbing against rock or hard surface can make the hook point loose its sharpness. Corrosion is a major problem affecting the strength and sharpness of fishing hooks. Fishermen often test the hook



Outline of a typical hook showing depth of penetration



Experimental setup showing sharpness test using Universal Testing Machine

केन्द्रीय मत्स्यकी प्रौद्योगिकी संस्थान

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sharpness by dragging the point across the thumbnail. A sharp point digs into the nail on applying light pressure while a blunt point slides across the nail. However, there is no standard method to assess the sharpness.

At CIFT, Cochin a new method was developed to assess the sharpness of fishing hook by assessing the compression load required to penetrate wax block to a depth equal to the distance from the tip of 'point' of hook to the tip of 'barb'. It is assumed that a sharp hook requires fewer loads to penetrate wax than a hook with lesser sharpness. Effect of corrosion on sharpness of hook was assessed by

this method. Test was conducted using Universal Testing Machine under compression mode and assessed the load required by corroded (hook exposed to corrosion medium in a Salt Spray Apparatus) as well as control hook (Round bend No. 7 hook), to penetrate a wax block upto 4 mm.

The compression load required was 205.40 ± 16.07 N and 276.74 ± 25.40 N for control hook and corroded hook (500 h exposed to salt spray) respectively indicating that corroded hooks requires more force to have the same level of penetration of wax block which is a result of reduced sharpness of the hook.

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Intestinal Enterobacteria of Bombay Duck

Bombay duck (*Harpadon nehereus*) is a voracious carnivorous fish species abundantly present in the north western sea region of Indian subcontinent. Limited literature is available regarding the intestinal Enterobacteria of the Bombay duck species of Indian subcontinent. Hence, Mumbai Research Centre of CIFT has taken an attempt to identify the intestinal Enterobacteriaceae species of Bombay duck species along Maharashtra coast.

Bombay duck was procured from the local fish market of Vashi, Navi Mumbai. The intestine of the fish was collected aseptically and the gut contents were serially diluted in buffer solution and spread over the VRBGA plates. The plates were kept for incubation at 37 °C overnight. From the VRBGA plates, individual colonies were streaked over the Brain Heart Infusion (BHI) slants and gram stain, catalase, oxidase and motility test were carried out. Gram negative bacteria were further tested in

API test strips for identification at species level. All the tested samples were subjected to antibiogram analysis using 20 antibiogram antibiotic discs (Himedia, # IC008, Icosa G -II-Minus).

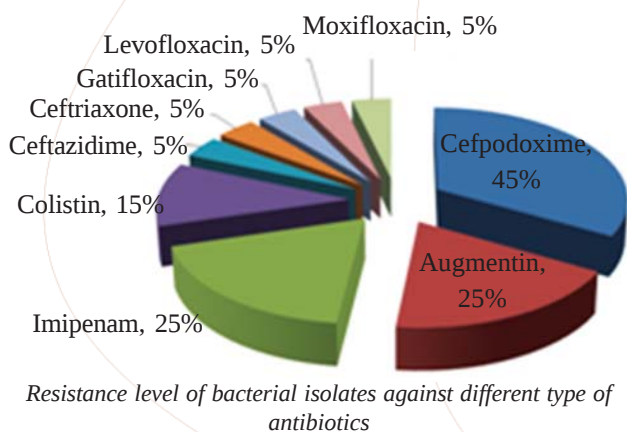
Twenty numbers of gram negative bacteria were isolated from the intestine of the Bombay duck for the identification of microbial diversity. The isolates were identified up to species level using API test strip. The isolates were identified as *Proteus penneri*, *P. vulgaris*, *P. mirabilis*, *Grimontia hollisae*, *Chryseobacterium indologenes*, *Pantoea* sp., *Pasturella aerogenes*, *Rahnella aquatilis*, *Cedecea davisae*, *Morganella morganii*, *Plesiomonas shigelloides* and *Citrobactor braakii*.

Among the 20 isolates, six isolates were multiple drug resistant (MDR). Eight isolates were resistant to single antibiotic; remaining six isolates were susceptible to all 20 antibiotics. The isolates were resistant to Cefpodoxime (45%), followed by Augmentin and Imipenem (25%), Colistin (15%), Ceftazidime, Gatifloxacin, Levofloxacin, Moxifloxacin and Nitrofurantoin (all 5%). All 20 isolates were susceptible to the Gentamicin, Ofloxacin, Tobromycin, Amikacin, Nalidixic acid, Ciprofloxacin, Co-trimaxazole and Aztreonam.

In Bombay duck intestine majority of the Enterobacteriaceae isolates belong to genus *Proteus* and *Cedecea*. Among the isolated species, 45% isolates were resistant to Cefpodoxime and 25% isolates were resistant to Augmentin (Amoxallin and Clavulanic acid) and Imipenem.

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Preparation of Restructured Products from *Pangasius hypophthalmus*

Aquaculture contributes more than 50% of the total inland fish production. One of the fastest growing freshwater fish species suitable for aquaculture all over the world is *Pangasius* or Basa catfish. *Pangasius hypophthalmus*, has proven particularly adaptable for intensive production. The aquaculture potential of this species in tropical regions of the world outside of Southeast Asia appear to be excellent and it has become an economically valuable freshwater fish. Being influenced by international market, large numbers of farmers in India got fascinated to culture *P. hypophthalmus*. On an average, India imports over 5,000 tonnes of Basa every month. Also, a large number of super markets in major cities are selling sliced and packed Basa. Recently, farmers in Andhra Pradesh started farming Basa on a large scale. The productivity in Andhra is 50 tonnes/hectare. It is a promising rate compared to the rate of other items like Scampi and Black Tiger shrimp. It is mostly marketed in fresh and frozen or as thawed fillet in seafood markets. Quality and hygiene of any seafood product is dependent on the production chain, the quality of the water where the fish are raised, fish handling during filleting and freezing. Until now little or few efforts have been made to produce value added products from *Pangasius*. Restructured fishery products are products made from minced and/or chopped muscle and which, with or without other ingredients, are used to make other products with a new

appearance and texture.

Based on this background, an attempt was made to prepare the restructured products from *Pangassius* sp. using chitosan as functional ingredient. Frozen *Pangassius* fillets were purchased from M/s. Prime Exports, Chertala and brought to the laboratory in insulated boxes. Fillets were thawed and minces were prepared by using a meat mincer. The homogenized mince was used to prepare restructured products. Various ingredients for the products were selected based on sensory evaluation. Composition included mince (100g), chitosan (0.75%), sodium tri polyphosphate (0.25%), Sodium chloride (1%) and starch (4%). In order to find out a suitable starch for the product preparation, different starch were used which includes wheat flour, maida flour, tapioca flour and corn flour. The ingredients were added one by one to the mince in the order: sodium chloride, sodium tri polyphosphate (0.25%), chitosan (0.75%) and starch (4%) and mixed well. The mix was kept at refrigerated condition for 30 min. Then it was spread in an oil smeared stainless steel plate and cooked at 90-100 °C for 30 min. After cooking, the plates were immediately removed, and cooled. After cooling the gels were cut in to required shape and removed from the plate and their quality were analyzed. Moisture, protein, fat, ash, sodium, potassium and calcium were determined by the method of AOAC (2006).

Biochemical composition of restructured products is given in the Table. Product contained moisture of 76.86-78.30%, protein content of 11.88-11.99%, fat content of 5.06-5.27% and ash content of 2.15-2.29%. Sodium, potassium and calcium were found to be 2.66-3.20g%, 0.68-0.72%, 0.29-0.34g% respectively.

For sensory evaluation, the products were battered and breaded and then fried in oil till both sides turn in to light brown colour. Sensory evaluation was done by using 10 point hedonic scale. The overall acceptability scores for all



Before cooking



After cooking

Restructured products

Biochemical composition of restructured products

Sample/ parameter	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Sodium (g%)	Potassium (g%)	Calcium (%)
WF	77.16	11.99	5.06	2.27	2.66	0.69	0.30
MF	76.98	11.95	5.11	2.29	2.64	0.68	0.29
TF	76.86	11.88	5.24	2.22	3.24	0.78	0.34
CF	78.30	11.99	5.27	2.15	2.91	0.72	0.30

WF - Product containing wheat flour; MF - Product containing Maida flour; TF - Product containing Tapioca flour; CF - Product containing corn flour





the products were between 8 and 9 indicating that in general all the products were good. However the products incorporated with corn flour scored highest in over all acceptability. Application of *Pangasius* minces for the development of restructured products offer new opportunities to develop novel healthy and convenience

food for the modern market. Additionally inclusion of chitosan to the fish mince provides possibility of developing functional food with beneficial effects. However, the effect of incorporation of chitosan in extending the shelf life of the products needs further investigations.

Sensory evaluation of restructured products

Sample/ parameter	Appearance	Flavour	Taste	Texture	Over all acceptability
WF	8.8	8.3	8.3	8.0	8.2
MF	8.8	8.6	8.6	8.5	8.6
TF	8.8	8.3	8.3	8.0	8.0
CF	8.8	9.0	9.0	8.5	9.0

WF - Product containing wheat flour; MF - Product containing Maida flour; TF - Product containing Tapioca flour; CF - Product containing corn flour

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Proximate Composition and Fatty Acid Profile of Myctophid Species (*Diaphus thiollieri*) Caught from the Arabian Sea

World per capita food fish supply increased from an average of 9.9kg (live weight equivalent) in the 1960s to 18.6kg in 2010. With the increasing global population, in order to maintain at least the current level of per capita consumption of aquatic foods, an additional 23 million tonnes of fish will be required by 2020 (FAO, 2012). About 35% of Indian population eats fish and the annual per capita consumption of fish eating population is projected to rise to 18.5kg by 2020 and is expected to rise further with improvement in socio-economic conditions. Harvesting of under-utilized fish resources are among the possible solutions to increase capture fish production and also to facilitate recovery of over-exploited conventional fish resources. Under-exploited resources such as mesopelagic fishes, mostly constituted by myctophids, squids and krill,

are the most promising potential resources in this respect (FAO, 2001).

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 (Gjosaeter, 1984). Vipin *et al.* (2012) have reviewed the existing information and reported 137 myctophid species from Indian Ocean. Stock sizes of mesopelagic fishes have been estimated to be 257 million tonnes in the Western Indian Ocean and 94 million tonnes in the Eastern Indian Ocean (Gjosaeter and Kawaguchi, 1980). Myctophids are generally small, ranging in size from 3 to 30 cm, 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 make daily migrations ascending into shallow (<100 m) or surface waters (<5 m) at night and returning to deep waters (typically 250 to >1000 m) during the day (Shotton, 1997).

Myctophids are known to be an important prey for various marine animals. Their lipids, which are reported to



Diaphus thiollieri

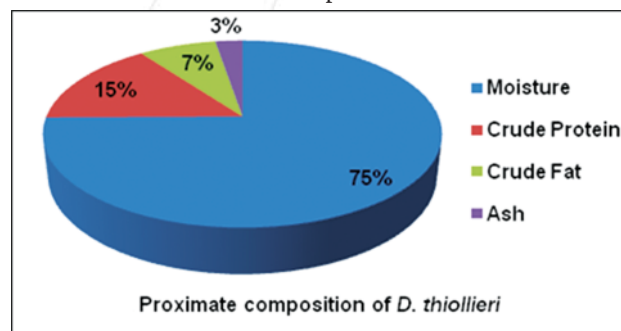


contain high amounts of wax ester, are an important energy source for their predators (Tyler and Percy, 1975). Several studies reported that myctophids are potential source for production of various commercial fishery products such as fish meal, fish oil, fish silage and Surimi and some other products like lubricating oil, cosmetics and wax (Nair *et al.*, 1983; Noguchi, 2004; Olsen *et al.*, 2010). The purpose of the present study was to investigate the proximate composition and fatty acid analysis of myctophid species *Diaphus thiollieri* in terms of nutritional benefits. The myctophid samples collected during February 2012 from the catch of FORV Sagar Sampada cruise along 18°-20° N latitude and 65°-68° E longitude at a depth range of 2300-200 m were stored in cold condition and brought to the laboratory. The average length (48 ± 3 mm, SL) and weight (1.308 ± 0.14 g) of the samples were noted.

Moisture content was determined by drying the homogenized sample in an oven at 105 °C overnight until a constant mass was obtained (AOAC, 2000). Crude protein content was determined by Kjeldahl Method. The concentration of total nitrogen was measured and conversion factor 6.25 was used to calculate crude protein (AOAC, 2000). Crude fat content of samples was determined with soxhlet apparatus using petroleum ether as extraction solvent (boiling point 40-60 °C) (AOAC, 2000). Ash content was determined by heating the sample in a muffle furnace at 600 °C for 6-8 h (AOAC, 2000). For the analysis of fatty acid components, the fat was extracted using methanol: chloroform mixture (2:1, v/v), saponified and trans-esterified yielding fatty acid methyl esters (FAME). These esters were extracted with n-hexane/water mixture (1:2, v/v). After removal of the aqueous layer, the n-hexane layer was passed through Na₂SO₄, concentrated *in vacuo*, reconstituted in petroleum ether, and stored at -20 °C until required for analyses. Gas chromatograph (Varian Star #1) equipped with a Flame Ionisation Detector (FID) was used for analysis of the fatty acids. The esterified fatty acids were analyzed by gas liquid chromatography with FID detector and compared with fatty acid methyl ester standards (Supelco FAME 37 standard).

The moisture, crude fat, crude protein and ash content in *D. thiollieri* was 76.35%, 7.65%, 15.33% and 2.69% respectively. Higher protein and fat content of this species could well be a potential source of alternative protein and fat. Fatty acid profile of *D. thiollieri* showed that the species have a higher poly unsaturated fatty acid (PUFA) content. The fatty acid composition of *D. thiollieri* consists of Saturated fatty acid (SFA) - 31.54%, mono unsaturated fatty

acid (MUFA) - 21.18% and PUFA - 46.35%. Among the saturated fatty acids, palmitic acid was present in higher level (19%). In the category of mono unsaturated fatty acids, oleic acid was the prominent one (11.05). Within the poly-unsaturated fatty acids, Docosahexanoic acid (DHA) content was present in a higher amount (32.5%) followed by eicosapentanoic acid (EPA) 6.73%. With the presence of higher level of DHA, a fatty acid with potential health significance, *D. thiollieri* may be considered as a viable source for the extraction and purification of DHA.



Fatty acid profile of *D. thiollieri* (%)

Carbon No.	Fatty acids	Fatty acid (%)
Saturated fatty acids		
C14:0	Myristic acid	2.38
C15:0	Pentadecylic acid	0.62
C16:0	Palmitic acid	19.00
C17:0	Margaric acid	1.12
C18:0	Stearic acid	5.30
C20:0	Arachidic acid	0.43
C22:0	Behenic acid	0.63
C23:0	Tricosylic acid	2.06
Total SFA		31.54
Mono unsaturated fatty acids (MUFA)		
C16:1	Palmitoleic acid	3.30
C17:1	Heptadecenoic acid	0.47
C18:1	Oleic acid	11.05
C20:1	Eicosenoic acid	0.47
C22:1	Erucic acid	0.49
C24:1	Nervonic acid	5.40
Total MUFA		21.18
Poly unsaturated fatty acids (PUFA)		
C18:2	Linoleic acid	1.18
C18:3	α-Linolenic acid	0.65
C20:2	Eicosadienoic acid	0.29
C20:3	Eicosatrienoic acid	2.14
C20:5	Eicosapentaenoic acid	6.73
C22:2	Docosadienoic acid	2.86
C22:6	Docosahexaenoic acid	32.50
Total PUFA		46.35





Currently, commercial exploitation of world mesopelagic resources are minimal. Dwindling catches from the inshore waters of the world oceans and a decline in the traditional marine fisheries has made myctophids a potential resource for exploitation. It is mainly used for production of fish meal and oil and a small percentage is used directly for human consumption. Biochemical composition of many species of myctophids revealed that these fishes can become a major source of fish protein, omega 3 fatty acids and production of value added seafood products when efficient harvesting, appropriate processing and value addition technologies are evolved.

References

- FAO (2001) - Report of the Trilateral Workshop on Lanternfish in the Gulf of Oman. Muscat, the Sultanate of Oman, 7-9 May 2001. FAO Fisheries Report. No. 665. FAO, Rome. <http://ftp.fao.org/docrep/fao/007/y2967e/y2967e00.pdf>: 22 p.
- FAO (2012) - The State of World Fisheries and Aquaculture (SOFIA), FAO, Rome. <http://www.fao.org/docrep/016/i2727e/i2727e00.htm>
- Gjosaeter, J. (1984) - Mesopelagic fish, a large potential resources in the Arabian sea. *Deep Sea Res.*, **31**: 1019-1035.
- Gjosaeter, J. and Kawaguchi, K. (1980) - A review of the world resources of mesopelagic fish, FAO Technical Report 93, FAO, Rome: 151 p.
- Nair, A.L., James, M.A., Mathew, P.T. and Gopakumar, K. (1983) - Studies on Lanternfish *Benthosema pterotum* - nutrition evaluation, *Fish. Technol.*, **20**: 20-23.
- Noguchi, S.F. (2004) - Utilization of the resources of Lanternfish as fisheries products, In: More Efficient Utilization of Fish and Fishery Products. Developments in Food Science, (Eds: Sakaguchi, M.), pp. 63-74, Elsevier, Amsterdam
- Olsen, R.E., Waagbo, R. and Melle, W., Ringo, E. and Lall, S.P. (2010) - Alternative Marine Resources. In: Fish Oil Replacement and Alternative Lipid Sources in Aquaculture Feeds (Eds: Giovanni, M., Turchini, G.M., Ng, W.K. Tocher, D.R.), pp. 268-324, CRC Press, Boca Raton, FL
- Shotton, R. (1997) - Lanternfishes: A potential fishery in the Northern Arabian Sea? In: Review of the State of World Fishery Resources: Marine Fisheries. FAO Fisheries Circular No. 920, FAO, Rome
- Tyler, H.R. and Pearcy W.G. (1975) - The feeding habits of three species of Lanternfishes (family Myctophidae) off Oregon, USA. *Mar Biol.*, **32**: 7-11.
- Vipin, P.M., Renju Ravi, Jose Fernandez, T., Pradeep, K., Boopendranath, M.R. and Remesan, M.P. (2012) - Distribution of myctophid resources in the Indian Ocean. *Rev. Fish Biol. Fish.* **22**: 423-436.

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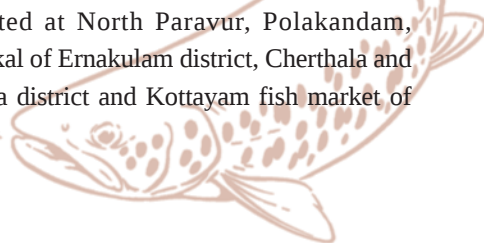
Fish Processing Division, CIFT, Cochin

Methicillin-Resistant *Staphylococcus aureus* - an Emerging Pathogen Associated with Seafood Industry

Staphylococcus aureus is a gram positive, non-motile, catalase and coagulase positive, facultative anaerobic bacteria capable of producing disease from milder form of illness like abscesses in human being, food poisoning (Staphyloenterotoxiosis) to a fatal therapeutic failure due to the emergence of the antibiotic resistance. Antibiotic resistant strains of *S. aureus* are a growing threat to public health. Methicillin-resistant *S. aureus* (MRSA) is now one among the most dangerous pathogen in the environment including food. Methicillin-resistant *S. aureus* (MRSA) was first reported in 1961 and the pathogen has now become a major nosocomial pathogen worldwide and there is drastic increase in incidence every year. The major reservoirs of these strains are infected patient's (human being) nasal tract. Animals, food and food handlers also serve as potential

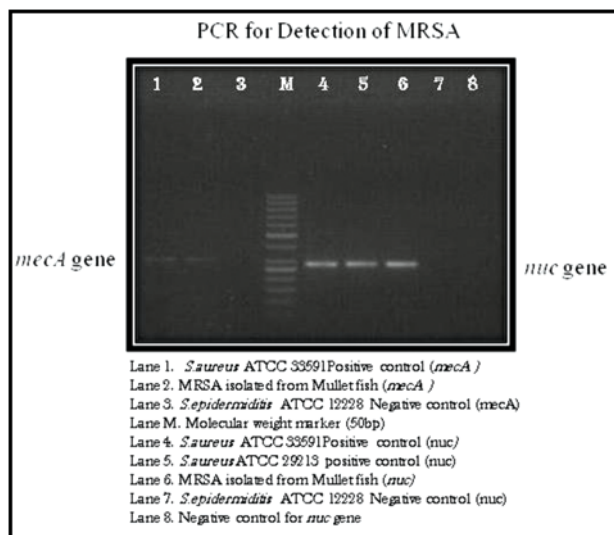
agents for the spread of the infection. Foods including seafood, also has the potential to become the vehicle for the spread of these types of MRSA. Usually there is a strong correlation between the antibiotic resistance profiles and presence of the gene responsible for the expression of these properties. Hetero-resistance to Methicillin is dependant on the structural gene *mecA*. A study was conducted to assess the prevalence of Methicillin-resistant strains of *S. aureus* in seafood and confirmation of the Methicillin-resistance specific (*mecA*) gene by Polymerase Chain Reaction (PCR).

A total of 29 seafood samples collected from various fish markets located at North Paravur, Polakandam, Edavanakadu, Nilakal of Ernakulam district, Cherthala and Aroor of Alappuzha district and Kottayam fish market of





Kottayam district were analyzed for *S. aureus* using standard method (BAM, 2001). The study revealed the occurrence of *S. aureus* in 51% of the samples. The antimicrobial susceptibility test was carried out as per standard guidelines



of CLSI, 2007 and the result revealed that only one sample (Mullet) harbored Methicillin-resistant *S. aureus* (MRSA). PCR was performed for the confirmation of the species specific *nuc* gene and Methicillin-resistance specific (*mecA*) gene. The presence of *mecA* gene was confirmed in the Methicillin-resistant strain isolated from fish.

Due to advertent usage of antibiotics in the aquaculture industry and the unhygienic handling of fish/shellfish in the market, there is a very high chance for the prevalence of MRSA in seafood. The emergence of MRSA is recognized as an environmental hazard to the food supply and human health, as it makes eradication more difficult. There is an increasing risk of MRSA infection for fish handlers and consumers. A key strategy for preventing MRSA transmission is to clean and disinfect the targeted surfaces and areas. Another strategy to reduce MRSA in fish/shellfish is by reducing the use of antibiotic in aquaculture farms. Persons working in food preparation and processing facilities should practice hygienic handling methods to improve safety of foods. Foods must be cooked properly and refrigerated or kept hot until consumption.

V. Murugadas, Toms C. Joseph and K.V. Lalitha

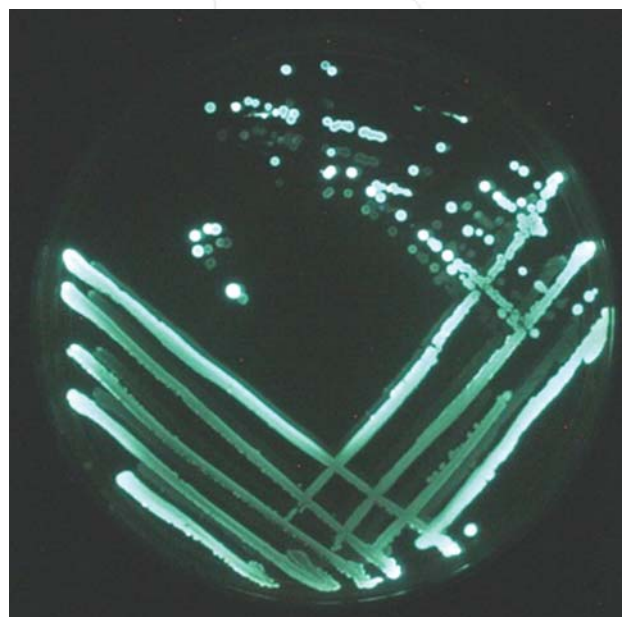
Microbiology, Fermentation and Biotechnology Division

Incidence of Abnormal Blue Colouration in Coastal Fishes Landed Along Kerala Coast

During the month of May-June 2013, a peculiar phenomenon of effervescent and immediately fading blue discolouration was reported in freshly landed coastal fish species across south Kerala coast. The fishes in which such phenomenon was reported were Oil sardine (*Sardinella longiceps*), Mackerel (*Rastrelliger kanagurta*), Pink Perch (*Nemipterus japonicus*) and some carangids. Presuming it to be a case of adulteration with some chemicals, the matter was brought to the notice of Food Safety Commissioner, Govt. of Kerala. It was reported that when the fishes were pre-processed or dressed by fish vendors in the market, there was a sudden splurge of blue colour emerging out of the entrails, which subsided or completely diminished after sometime. There was a panic among fish consumers across the state and prevalence of such a phenomenon was extensively reported by the vernacular print media. The matter was brought to the notice of CIFT and samples of implicated fishes were made available by food safety officials for immediate examination.

The fishes were analyzed in the Quality Assurance and Management Division for the presence of any off-odour

and trace of chemicals or non-approved food additives. There was no perceptible chemical taint in any of the samples. When the intestine were cut open, it exactly



Isolated *Photobacterium damsela* on BOSS Medium





Photobacterium damsela

Kingdom	: Bacteria
Phylum	: Proteobacteria
Class	: Gammaproteobacteria
Order	: Vibrionales
Family	: Vibrionaceae
Genus	: <i>Photobacterium</i>
Species	: <i>damsela</i>
Synonyms	: <i>Vibrio damsela</i> <i>Listonella damsela</i>

coincided with the complaint received earlier i.e. there was immediate bluish tinge followed by rapid bleaching. To find out whether the bluish tinge sustained in absence of light, the fishes were examined in dark. A luminescent bluish-green glow was observed in the intestinal parts. Hence the case was attributed to the proliferation of luminescent bacteria in the feeding grounds of these fishes. Swabs were taken from the intestine and all the glowing areas were transferred to BOSS medium (Klein *et al.*, 1998) for isolation and further identification of the luminescent bacteria. The isolated luminescent colonies were identified using API 20E kit (bioMerieux) as *Photobacterium damsela*.

Similar incident was reported in 1998 (Malayala Manorama Daily, 24 August, 1998) where fish workers reported high glow or luminescence coming from the fishes while dressing *Nemipterus* at night and they refused to handle fishes. After thorough investigation, CIFT had issued a press note stating that there is no food safety concern to the public and presence of glow was traced to the swarming of luminescent bacteria in coastal waters during monsoon season.

Members of *Photobacterium* genus are gram negative, bioluminescent and widely distributed in marine environment. They are either free-living or symbiotic with marine organisms; exhibit fluorescence only when cell density reaches a high level. Out of the 16 species reported so far, 15 are found pathogenic to fish species. The species isolated in the present investigation *Photobacterium damsela* is a virulent fish pathogen. Virulence of this species as a human pathogen through consumption of seafood has not been established so far. But, it can gain entry through skin ruptures or open wound and hence can cause primary septicemia in food handlers. Hence adequate care should be taken by the food handlers while pre-processing the implicated fishes during monsoon season.

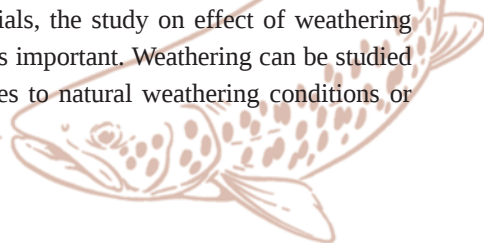
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Weather O Meter (Xenotest) for Testing Weathering and Colour Fastness of Craft and Gear Materials

Fishing gear comprises of hooks and lines and fishing nets of different types. Fishing nets are made of nettings/webbings made into different shapes and sizes. From time immemorial, natural twines like cotton, jute, silk and coir were used as fishing gear materials. These materials being cellulosic in origin are subject to bio-deterioration. In early 1950s synthetic fibres were introduced to the fishing sector which was a revolutionary step in the industry. This was introduced to the Indian fishing industry by late 1950s. Their use has played an important role in the advances that have triggered the development of the fisheries sector. The synthetic materials comprise of seven groups viz., polyamide (PA 6 and PA 6.6), polyethylene (PE), polypropylene (PP), polyester (PES), polyvinylchloride (PVC), polyvinylidene chloride (PVD) and polyvinyl alcohol (PVAA) of which polyamide, polyethylene and polypropylene are the three main groups used in the Indian fishing industry. Synthetic fibres have overcome many problems of natural fibres like bio-deterioration, increase in weight and swelling of

webbing on wetting. However, susceptibility to weathering is a major problem of synthetic fibres and all synthetic fibres are affected by sunlight to different degrees depending on the type of polymer and material thickness.

Weathering is a natural phenomenon that occurs in every object that is exposed to natural conditions. Natural exposure conditions vary widely with location and period of year. Sunlight-induced degradation is the principal mechanism of weathering. Solar irradiance on materials causes fading, colour change, surface erosion, loss of gloss, break down of materials leading to weight loss and loss of strength properties. Synthetic twines have been associated with deterioration caused by environmental factors including ultra-violet radiation which is known to affect breaking strength. As weathering affects the longevity and efficiency of materials, the study on effect of weathering on these materials is important. Weathering can be studied by exposing samples to natural weathering conditions or





Xenotest Alpha+

by artificial weather simulating conditions. A time period of 1 to 20 years is commonly required for testing the durability of different materials exposed to weather. As waiting for such a long period is impractical, adoption of artificial exposure processes called accelerated weathering which take very less time is necessary. Artificial weathering can be studied in the laboratory by using Weather O Meters using light sources such as fluorescent arc, UV arc, Carbon arc, Mercury arc and Xenon arc.

Weather O Meters using light sources of Carbon arc and Xenon arc are common. Xenon arc is a good substitute as it approximates solar radiation and gives very steady illumination.

CIFT has procured a Weather O Meter (Xenotest Alpha+) to study the effect of weathering on fishing gear materials. Xenotest Alpha+ is a universal weathering instrument made by M/s Ametek Instruments India Pvt. Ltd. using Xenon arc as the major light source for testing the light fastness and weatherability of materials under normal, high temperature and high energy conditions. Light fastness usually refers to colour fading of materials exposed to outdoor daylight. The Xenotest has undergone several modifications since it was introduced in 1954. Xenotest Alpha+ is designed as a successor model for the Xenotest 150S and introduced in market in 1991. It is used for exposing material samples to irradiation and weather and is suitable for continuous operation. It is characterized by irradiance range for normal or high energy conditions and a large variety of filter systems with an option of sample holders with turning (flip-flop) or non-turning mode.

Important features

- ◆ **Programme Control:** The instrument is characterized with a Microprocessor control with interactive user guidance which allows the request of pre-programmed test sequences as well as the design and initialization of user specific tests. The parameter values required for the tests are entered using the numeric keypad and initialized using the various function keys.
- ◆ **Filter System:** The equipment has a filter system that

adapts for non-aging Xenochrome filter systems or absorption filter systems. The function of absorption filters is to absorb the undesirable parts of the Xenon spectrum and are absorbed by the filter material. These absorption filters have to be replaced regularly. The undesirable parts of the spectrum are reflected by a special reflecting layer and cooled down by absorbers of Xenochrome filters. Xenotest Alpha+ has a sample holder carousel to take upto 11 specimen holders.

- ◆ **Irradiation System:** The instrument is equipped with an UV irradiance range of 300-400 nm. The samples on the sample carousel revolve around the xenon lamp and the filter system so that they are irradiated.
- ◆ **Ventilation System:** The instrument is air cooled and the cooling system is fed by two separate air streams, lamp cooling and test chamber cooling.
- ◆ **Misting and Humidification:** The misting and humidification function allows the sample to be tested in test chamber under clearly defined climatic conditions. The humidification function allows the relative humidity in the test chamber to be regulated. The adjustment range is between 10% and 95% RH. The misting function allows the samples to be wetted with treated water applied without pressure at cyclic intervals.
- ◆ **Measuring and Control Sensor System:** The equipment has a combined test chamber temperature and humidity sensor to control continuously the temperature and relative humidity in the test chamber. Irradiance can be measured and controlled by rotating sensors. With the rotation option activated, the samples on the sample holder are also rotated by 180° around their axis during each revolution of the carousel. Black standard and panel sensors help to measure and control black standard temperature and panel sensor temperature. Humidity sensor helps to measure and control relative humidity.

The materials that can be tested in the equipment are synthetic polymers such as nylon, polyethylene, polypropylene, natural fibres such as cotton, coir, jute, FRP, plastics, metal sheets/strips and wood in various shapes such as single twine, wire, webbing and sheet of up to 15 mm thickness and also paints and coatings.

Selection of parameters to imitate natural conditions is very important. The parameters that can be monitored are Irradiance, Chamber temperature, Black standard temperature and Relative humidity. When light phase is on,





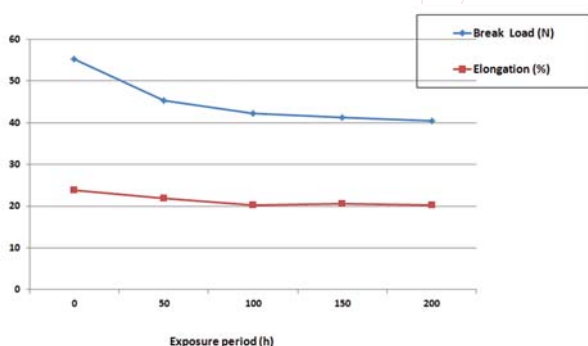
the irradiance range should be between 21-93 W/m². The Chamber temperature and Black standard temperature should be between 20-70 °C and 20-80 °C respectively. When water spray is on, the range of relative humidity is between 10% and 95%.

Applications

The instrument has wide applications in the field of textiles, fishing gear materials, plastics, paints and coatings and FRP which face a major problem of weathering and colour fastness.

Applications and Reference Test Methods for Xenotest Alpha+

Plastics	ISO 4892 Part 2, DIN 53387
Paints and coatings	ISO 11341 Method 1 and 2
Textiles	DIN 54004, DIN 54071, ISO 105 BO2/BO4, M and S C9 Colour Fastness to light, ISO Blue wool (1-8), AATCC Blue wool (L2 - L4)



Break load and elongation of polyamide twine exposed to Xenon arc

Weathering studies in Xenotest take only one-seventh to one-tenth of the time than the samples exposed to natural conditions. The level of degradation can be assessed by change in weight, tensile strength, X-ray analysis and FTIR

analysis of the samples exposed to Xenon arc for selected periods and conditions.

Light fastness/colour fading can be measured using Blue wool method. ISO blue wool (Number 1-8) is used as the standard. The fastness grade corresponds to the level of blue scale which is closest to the colour difference between original specimen and the tested one. The parameter is very important as far as the textile and coir industry are concerned.

Studies were carried out at CIFT on standardization of experimental conditions for testing different materials in Xenotest. The weathering study was conducted by exposing polyamide 210 x2 x2 twine at Relative humidity 50%, Irradiance 45 W/m², Chamber temperature 35 °C and Black standard temperature 50 °C in the Xenotest for 200h. The samples were exposed to a cycle of 51 min. light phase followed by 9 min. water spray for the experimental period. The sub-samples retrieved after every 50 h were tested for change in break load and elongation at break and the results showed that on exposure of polyamide 210 x2 x2 for 200 h in Xenotest, there was 26.84% decrease in break load and 14.56% decrease in elongation. Further studies in weathering and colour fastness are in progress.

This equipment is very useful for the study of weathering and colour fastness of materials such as polyamide, polyethylene, FRP, plastics, paint coated metal strips and wooden samples in shapes such as single twine, wire, webbing, film and sheet. It has more applications in the textile sector including jute and coir for weathering and colour fastness assessment. Once the experimental conditions for weathering is standardized and determined, the simulating conditions helping in saving time and energy required for assessing the parameters and behavior of the materials in natural conditions can be predicted. This would help in assessing the longevity of materials and coatings in different climatic and service conditions.

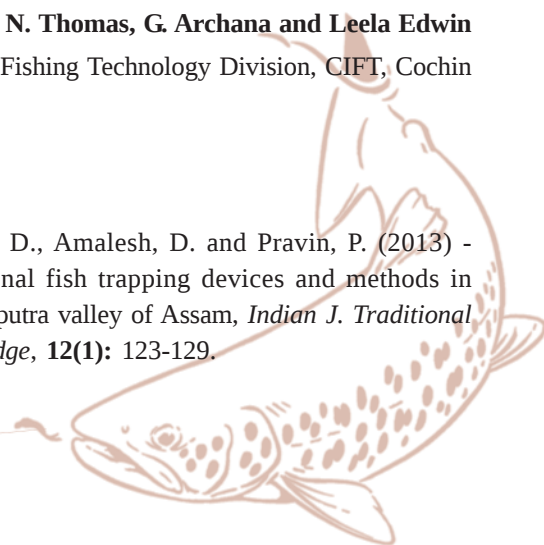
Saly N. Thomas, G. Archana and Leela Edwin

Fishing Technology Division, CIFT, Cochin

Publications

Research Papers/Popular Articles

1. Abhilash, S., Sreenath, P.G., Ravishankar, C.N. and Srinivasa Gopal, T.K. (2013) - Standardization of process parameters of ready-to-eat crab kofta in indigenous polymer-coated tin-free steel cans, *Fish. Technol.*, **50(1)**: 154-160.
2. Baruah, D., Amalash, D. and Pravin, P. (2013) - Traditional fish trapping devices and methods in Brahmaputra valley of Assam, *Indian J. Traditional Knowledge*, **12(1)**: 123-129.





3. Binsi, P.K., Vishnuvinayagam, S., Viji, P., Zynudheen, A.A. and Chakrabarti, R. (2013) - Fish scale - A biomaterial with versatile applications, *Infofish Intl.*, **3**: 41-43.
4. Boopendranath, M.R., Pravin, P., Gibinkumar, T.R., Sabu, S. and Madhu, V.R. (2013) - Investigations on juvenile fish excluder cum shrimp sorting device (JFE-SSD), Springerplus, **2**: 271. <http://www.springerplus.com/content/2/1/271>.
5. Femeena Hassan, Joshy, C.G. and Saleena Mathew (2013) - Quality evaluation of a battered and breaded seafood product under chilled storage, *Fish. Technol.*, **50(1)**: 139-145.
6. Femeena Hassan, Lakshmanan, P.T., Geethalakshmi, V. and Mukundan, M.K. (2013) - Evaluation of stabilized hydrogen peroxide as sanitizer in seafood processing industry, *Indian J. Fish.*, **60(2)**: 145-149.
7. George Ninan, Zynudheen, A.A., Joshy, C.G. and Sumna Yousaf, K. (2013) - Physical, chemical and functional properties of gelatin extracted from the skin of rohu, *Labeo rohita* and Yellowfin tuna, *Thunnus albacares*, *Indian J. Fish.*, **60(2)**: 123-128.
8. Kamalakanth, C.K., Bindu, J., Bijitha, K., Ravishankar, C.N. and Srinivasa Gopal, T.K. (2013) - Development and comparison of extruded bread crumbs for coating fish balls, *Indian J. Fish.*, **60(2)**: 129-134.
9. Madhu, V.R., Panda, S.K. and Meenakumari, B. (2013) - Trawl selectivity on *Johnius dussumieri* (Cuvier, 1830) along Gujarat, Northwest coast of India, *Fish. Technol.*, **50(1)**: 121-125.
10. Madhusudana Rao, B. and Surendran, P.K. (2013) - Pathogenic *Vibrios* in *Penaeus monodon* shrimp hatcheries and aquaculture farms, *Fish. Technol.*, **50(1)**: 161-167.
11. Martin Xavier, K.A., Ravishankar, C.N., Bindu, J. and Srinivasa Gopal, T.K. (2013) - Textural and colour changes of mackerel (*Rastrelliger kanagurta*) thermal processed at different retort temperatures, *Fish. Technol.*, **50(1)**: 133-138.
12. Meenakumari, B., Pravin, P. and Remesan, M.P. (2013) - Save the hilsa, Geography and You, *Fisheries Policies and Interactions*, **50(2)**: 121-125.
13. Pravin, P. and Meenakumari, B. (2013) - Purse seining in Kerala, *Science India*, **16(6)**: 4-10.
14. Viji, P., Binsi, P.K., Vishnuvinayagam, S., Ravishankar, C.N. and Srinivasa Gopal, T.K. (2013) - Plant extracts: A promising natural preservative for fish and fishery products, *Beverages & Food World J.*, **40(6)**: 39-41.
15. Yadav, B.S., Ronda, V., Vashista, D.P. and Sharma, B. (2013) - Sequencing and computational approaches to identification and characterization of microbial organism, *Biomed. Engg. & Compt. Biol.*, **5**: 43-50.

Training Programmes

Cochin

1. Modern instrumental analysis in biochemistry (1-10 April)
2. Identification of genes responsible for hydrocarbon degradation in aquatic bacteria (1- 30 April)
3. FTIR spectra of selected *Vibrio* sp. (7 January - 6 April)
4. Water quality analysis (8-12 April)
5. Value added fishery products (17-18 April)
6. Seafood quality determination (22-27 April)
7. Seaweeds: Distribution and resources in selected islands of Lakshadweep (22 April - 4 May)
8. Microbiological changes in ammonia treated Indian mackerel (*Rastrelliger kanagurta*) during chilled storage (23 April - 23 June)
9. Biochemical changes in ammonia treated Indian mackerel (*Rastrelliger kanagurta*) during chilled storage (23 April - 23 June)
10. Nutritional evaluation of edible crab, extraction of astoxanthin and study of its bioactivity (26 February - 1 May)
11. Laboratory techniques in microbial biotechnology (5 February - 4 May)
12. Processing and packaging of value added fishery products (14-18 May)
13. Fish processing technology including analytical instrumentation, biochemical analysis and packaging (14-18 May)





14. Product development, quality evaluation and packaging of fishery products (20 May - 20 June)
15. Laboratory course on the biochemical evaluation of fish and fishery products (3-15 June)
16. Production of chitin and chitosan (5-6 June)
17. HACCP concepts (17-21 June)
18. Fish processing (20-22 June)
19. Processing and packaging of value added fishery products (24-28 June)
20. Preservation treatment of low cost timber for boat building (25 June)

Visakhapatnam

1. Value added fish products (20 May)

Participation in Exhibitions

During the quarter the Institute participated in the following exhibitions:

1. Tamil Nadu Fish Festival at Chennai during 9-12 May, 2013.



Tamil Nadu Fish Festival



International Symposium exhibition - Dignitaries at CIPT stall

Outreach Programmes

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

1. Skill up-gradation training programme on 'Hygienic handling of fish and prawn', at SIFT, Kakkinada on 17 April, 2013. A total of 15 beneficiaries of Fisherwomen Co-opetraive Societies of Sreekakulam, Vizianagaram and Visakhapatnam were the beneficiaries of the programme.
2. Skill up-gradation training programme in 'Hygienic handling of fish and prawn' for 15 fisherwomen from different Matsya Mitra Groups of Hyderabad Zone at SIFT, Kakkinada on 2 May, 2013.
3. Training programme on 'Value added fish products' sponsored by Corporate Social Responsibility Programme of Reliance Industries Ltd. for 39 fisherwomen of Gadimoga panchayat, East Godavari district, A.P. on 20 May, 2013.
4. Training programme on 'Hygienic handling and preparation of value added products' at SIFT, Kakkinada on 6 June, 2013.

Grand Finale of Golden Jubilee Celebrations of SOFTI

Dr. V. Prakash, distinguished CSIR Scientist and Shanthi Swarup Bhatnagar Award winner delivered the SOFTI Golden Jubilee Lecture at the Grand Finale function

of the Golden Jubilee Celebrations of Society of Fisheries Technologists India (SOFTI) on 21 May, 2013. Dr. V. Prakash in his speech opined that there is an absolute need



Dr. V. Prakash delivering the Golden Jubilee Lecture to declare Cochin as the "Fisheries Valley of India". Mariculture, aquaculture and ornamental fish culture are the money spinners today. The technologies coming out of the research institutes in and around Cochin should aid in achieving the 'Fisheries Valley' status to Cochin. He also mentioned that 'Aquaceutical' should be the new word in the field of neutraceuticals and also that integration of value addition and aquaceuticals is the need of the hour. Role of nutrition and neutraceuticals in today's world of quality aging is very big. Aqua-based vaccines is the future promise for health. Speaking on climate change and its effect on fish wealth, he emphasized that an integrated research need to be undertaken. Every year, 16 billion tons of carbon dioxide is emitted world over which affects the ocean too. To mitigate this, an integrated approach is the key which can be through the process of traditional knowledge and modern scientific data management.

The SOFTI Golden Jubilee Celebrations ended with the International Symposium on "Greening fisheries - Towards green technologies in fisheries". On this occasion



Dr. S.K. Tripathi offering felicitations. Also seen are Dr. P.T. Lakshmanan, Dr. K. Gopakumar, Dr. V. Prakash, Dr. T.K. Srinivasa Gopal, Shri Nobert Karikkassery, Dr. T.V. Sankar and Dr. K. Ashok Kumar

Dr. K. Gopakumar, former Deputy Director General (Fisheries), ICAR, New Delhi pointed out that today fishery technologies and fisheries science emerged as a major discipline in science. Creation of a large number of fisheries colleges, Universities and processing industries shows the importance of this science.

Dr. T.K. Srinivasa Gopal, Director, CIFT presided over the function. Felicitations were offered by Dr. S.K. Tripathi, former Director, CIFE, Mumbai, Dr. G. Syda Rao, Director, CMFRI, Cochin, Shri Nobert Karikkassery, President, SEAI, Cochin. The past executive committee members of SOFTI were honoured during the function. Dr. B. Meenakumari, Deputy Director General (Fisheries), ICAR inaugurated the exhibition held in connection with the Symposium. Earlier Dr. P.T. Lakshmanan, Vice President, SOFTI welcomed the gathering. Dr. K. Ashok Kumar, Joint Secretary, SOFTI proposed the vote of thanks.

International Symposium on Greening Fisheries and SOFTI Award Presentations

His Excellency Shri Nikhil Kumar, Governor of Kerala inaugurated the International Symposium on Greening Fisheries and presented the SOFTI Biennial Award at Cochin on 22 May, 2013. The three days symposium was organized in connection with the Golden Jubilee Celebrations of Society of Fisheries Technologists India. The Honourable Governor also gave away the Biennial SOFTI award for the outstanding fisheries scientist of the country for the year 2011 to Dr. S.A.H. Abidi, former Member, ASRB, New Delhi. Delivering the Chief Guest address Shri Nikhil Kumar opined that the expectation of the laymen of the country is that the research has to be cautionary on how the existing technologies can be improved upon keeping in mind the sustainability of fisheries. He also called upon the scientists to develop

appropriate new technologies which will benefit the fishermen as well as the fishing industry without indulging in over-exploitation of the ocean bounty.

The Governor also congratulated Dr. B. Meenakumari for becoming the first ever woman scientist to occupy the coveted position of Deputy Director General (Fisheries) at ICAR and also Dr. Ambekar E. Ekanth who is representing India in the international forum of NACA, Bangkok.

Dr. B. Meenakumari, Guest of Honour in her address stressed upon the relevance of green technologies in fishing considering the fact that globally about 47.5 billion people depend directly on income generated from fishing operations.





Hon'ble Governor Shri Nikhil Kumar inaugurating the International Symposium. Also seen are Dr. A. Ramachandran, Dr. T.K. Srinivasa Gopal, Dr. S.A.H. Abidi and Dr. B. Meenakumari

Felicitations were offered by Dr. Ambekar E. Eknath, Director General, NACA and Shri A.J. Tharakan, Chairman, M/s. Amalgam Foods, Cochin. Dr. T.K. Srinivasa Gopal, Director, CIFT presided over the meeting. Earlier Dr. A. Ramachandran, Registrar, CUSAT, Cochin welcomed the gathering. Dr. M.R. Boopendranath, Chairman, Editorial Committee, introduced the International Symposium on Greening Fisheries to the audience, while Dr. Leela Edwin,



Hon'ble Governor Shri Nikhil Kumar presenting the SOFTI award to Dr. S.A.H. Abidi. Also seen are Dr. Ambekar E. Eknath, Dr. A. Ramachandran, Dr. T.K. Srinivasa Gopal, Dr. B. Meenakumari and Shri A.J. Tharakan

Head, Fishing Technology gave an introduction on the SOFTI Award. A message from Dr. S. Ayyappan, Secretary, DARE and DG, ICAR was read by Dr. C.N. Ravishankar, Head, Fish Processing. Dr. Saly N. Thomas, Chief Editor, Fishery Technology read the citation of the SOFTI Award while Dr. T.V. Sankar, Secretary, SOFTI & Convener of the Symposium proposed the vote of thanks.

Advanced Training Programme on Shipflow

NAIP-RHSSP Project under operation at CIFT, Cochin, in association with Flowtech International AB, Sweden conducted a four-day advance training programme on SHIPFLOW during 15-18 April, 2013 at Cochin.

CIFT is engaged in the cutting-edge research to bring the benefits to the designers and builders of fishing vessels in the country. In this area, under the NAIP-RHSSP project, CIFT has been associated with Flowtech International AB, in using the SHIPFLOW CFD codes, jointly developed and updated by Chalmers Technical University, Sweden; SSPA, Gottenberg (one of the world's best ship towing tank facility) and Flowtech. This is a priority research area of common interest to all marine researchers and designers. The ship's

hydrodynamic performance can be studied and optimized at the highest level of sophistication through CFD techniques. It minimizes the implementation of model testing which is often prohibitively expensive in terms of time and budget. To help uncover the immense advantages of SHIPFLOW codes and to share the research in this area, CIFT, Cochin, in association with Flowtech International AB conducted the training programme.

SHIPFLOW stems from long term research at Flowtech International AB in close co-operation with SSPA, Sweden and the Naval Architecture Department at Chalmers University of Technology, Gottenberg. Top Shipyards,



Inaugural session in progress



Participants and faculty of the programme



Consultants and Universities are among the SHIPFLOW users. Developed by naval architects, physicists and numerical analysts, the software is optimized for ship hydrodynamics design. No general purpose code can compete with SHIPFLOW in hull design: grids are automatically generated, resistance and propulsion data are presented in the naval architects way and the solvers are adapted for hull geometries. Over the past 20 years SHIPFLOW has developed into a world standard for ship hydrodynamics CFD.

Lead times are more and more compressed in ship design, particularly at the initial phase where many variants need to be evaluated in a short period of time. An efficient possibility is offered by the potential flow panel methods in the SHIPFLOW module XPAN, which predicts important quantities like waves and wave resistance rapidly, yet with accuracy sufficient for hull ranking. Viscous effects are also important and implemented in the SHIPFLOW module XCHAP. Using SHIPFLOW's advanced gridding technique an array of optimizations can be done.

To perform such optimizations using CFD, a high level of knowledge of the software and hands on experience on varied flow regime around ship hulls is essential which was aimed with the training. The training consisted of exhaustive

theory and practical on Potential Flow Module, Wake and Resistance, Wave Resistance and related aspects, Meshing design and strategies, Hull optimization techniques, Boundary layer module, RANS (Reynolds Averaged Navier-Stokes) module, Propulsion optimization, Viscous free surface analysis, and Forebody optimization techniques.

The Course Directors were Dr. Leif Broberg, Dr. Michal Orych of Flowtech International AB, Sweden and Shri M. Nasser, Principal Scientist, CIFT. Dr. S. Ashaletha, Senior Scientist was the Programme Convener. The course was inaugurated by Prof. K.A. Simon, Director, Kunjali Marakkar School of Marine Engineering, CUSAT, Cochin on 15 April, 2013 in an august function presided over by Dr. T.K. Srinivasa Gopal, Director, CIFT. Shri Nasser welcomed the gathering and Dr. K.V. Lalitha, HOD, MFB and CPI of the project proposed the vote of thanks. The participants included academicians, scientists, naval architects and research students from leading organizations like Naval Science and Technological Laboratory, Indian Register of Shipping, Indian Maritime University, Indian Institutes of Technology (IITs, Kharagpur and Chennai), National Institute of Technology (NIT, Kozhikode) and leading design firms like SEDS, Navgathi, Vedam, NAPA, Teknomak Project etc.

Training -cum- Demonstration on Preservative Treatment of Low Cost Timber for Boat Building

A training-cum-demonstration programme on 'Preservative treatment of low cost timber for boat building' was organized by the Fishing Technology Division, CIFT, Cochin on 25 June, 2013. The main objective of the programme was creating awareness on the importance of using low cost timber for boat construction and demonstrating the newly installed Pilot Level Wood Preservation Facility for Boat Building for the benefit of



Dr. T.K. Srinivasa Gopal giving the inaugural remarks. On the dais are (L to R) Dr. P. Muhamed Ashraf, Dr. Leela Edwin and Dr. T.K. Dhamodaran, Scientist F, KFRI, Peechi

fisheries extension officers from government sector and co-operative sector, local boat builders, fishermen, research scholars working in the field etc. The high demand for conventional timbers for all construction purposes leads to the exploitation of forest resources and high quality timbers have become scarce and expensive. Therefore non-durable low value timbers need to be considered for construction of small fishing craft which reduces the initial building cost



Participants being explained about the wood preservation methods



as well as the replacement cost and conserves energy in boat building, thereby reducing carbon foot print. A total of 25 participants attended the training.

The inaugural programme started with the welcome address by Dr. Leela Edwin, Head, FT Division, CIFT, Cochin and Convener of the Programme. The inaugural remarks were given by Dr. T.K. Srinivasa Gopal, Director, CIFT, Cochin who presided over the meeting. He emphasized the need for value addition of non durable timber in the fisheries sector. Dr. T.K. Dhamodaran, Scientist F and Head, Department of Wood Science and Technology, Kerala Forest Research Institute, Peechi, offered felicitations. Dr. P. Muhamed Ashraf, Senior Scientist, CIFT proposed the formal vote of thanks.

The Technical Session started with a talk of Dr. T.K. Dhamodaran on 'Upgradation of low cost timber'. He stressed on the need for reduction in the use of energy intensive resources for boat building. According to him the pressure on forests has to be reduced and the use of timber from plantations has to be encouraged. He had an interaction with the trainers from fisheries sector regarding the problems and difficulties faced by them during the construction and operation of wooden canoes. Dr. Leela

Edwin gave a talk on 'Use of low value timber for aquatic purposes'. The technology for upgradation of rubber wood for construction of canoes developed by CIFT was explained in the Session. Types of preservatives used, method of treatment and exposure of treated rubber wood in different environmental conditions were discussed in detail. The results of the experiments showed that treated rubber wood is ideal for canoe construction. One of the participants shared his successful experience in using the rubber wood canoe given by CIFT.

The Practical Session conducted in the afternoon started with a class lead by Smt. K.G. Sasikala, Tech. Officer (T5), CIFT, on the 'Experiments undertaken on wood preservation by CIFT'. Chemical preservatives, different species of wood borers, and experimental aquarium were exhibited and explained in the Session. Technical staff and research scholars of the Division demonstrated the functioning of Pilot Level Wood Preservation Facility installed in the Division. Scantlings for boat building were treated with Chromated Copper Borate using Vacuum Pressure Impregnation Facility. The training programme concluded with the distribution of certificates to the participants.

Brainstorming Session on Sanitary and Phytosanitary (SPS) Measures in Fisheries

Fish and fishery products are traded extensively in the global market and the trade and health concerns of the international organizations make the Sanitary and Phytosanitary (SPS) measures important and significant. SPS measures are concerned to the provisions or regulations that a country adopts to protect human, animal and plant life and health within its territory against unsafe and contaminated food.

A one-day brainstorming session on 'Sanitary and Phytosanitary (SPS) Measures in Fisheries' was organized by National Academy of Agricultural Sciences, New Delhi

on 27 June, 2013 at New Delhi. Dr. T.K. Srinivasa Gopal, Director, CIFT, Cochin was the Convener and Dr. J.K. Jena, Director, NBFGR, Lucknow and Dr. T.V. Sankar, Head, QAM Division, CIFT were the Co-Conveners. The Session was chaired by Dr. Anwar Alam, Secretary, NAAS and former DDG (Engineering), ICAR and Dr. B. Meenakumari, DDG (Fisheries), ICAR was the Co-Chair. Twenty six invited participants from ICAR institutes, Universities, Department of Animal Husbandry, Dairying and Fisheries, EIC, MPEDA, NIPHATT and the seafood industry attended the Session.



Brainstorming session in progress. Seen are: Dr. B. Meenakumari, Dr. Anwar Alam and Dr. T.K. Srinivasa Gopal among others



Dr. Nikita Gopal, Dr. S.K. Panda, Dr. T.V. Sankar and Dr. K. Ashok Kumar among others





In the Technical Session that followed, Dr. T.V. Sankar presented an overview of the SPS measures. Shri Vishnu Bhatt, Fisheries Development Commissioner, DAHD&F, Ministry of Agriculture presented the major challenges for India with respect to SPS issues in fisheries. Dr. A.G. Ponnaiah, Director, CIBA, Chennai spoke on the quarantine measures for import of live aquatic organisms stressing the need for capacity building on risk assessment and

diagnostics and harmonization with international standards. Dr. S.K. Panda, Senior Scientist, CIFT presented SPS standards and cases of discrepancies in the regulations. Dr. K. Ashok Kumar, Principal Scientist, CIFT presented the industry perspectives of SPS measures while Dr. C.S. Shinekumar, Deputy Director, MPEDA, Cochin made the presentation on trade perspectives. The Technical Session was followed by a good discussion among the participants.

Deputation Abroad

Dr. T.K. Srinivasa Gopal, Director, **Dr. Nikita Gopal**, Senior Scientist, Extension, Information and Statistics Division and **Dr. Femeena Hassan**, Senior Scientist, Quality Assurance & Management Division, CIFT, Cochin were deputed to South Korea to attend the 10th Asian Fisheries and Aquaculture Forum held at Yeosu, South Korea during 30 April to 4 May, 2013.

Dr. Srinivasa Gopal and Dr. Femeena Hassan also attended the 4th International symposium on Cage aquaculture. Dr. T.K. Srinivasa Gopal also chaired the Session on Fisheries Processing on 2 May, 2013. In the Sessions they presented the following research papers:

1. Extraction of gelatin from Yellowfin tuna skin
2. Transformation in gender roles with changes in traditional fisheries in Kerala, India
3. Reduction of *Vibrio parahaemolyticus* (ATCC 17802) in edible oyster *Crassostrea madrasensis* (Preston) during depuration under laboratory condition
4. Location specific interventions for the empowerment of coastal women: An experience in Kerala

After attending the session on Fishing gear and technology Dr. Srinivasa Gopal also visited Chungnam National University. Dr. Nikita Gopal also participated in the 4th Global Symposium on Gender in aquaculture and fisheries.

Dr. Leela Edwin, Head, Fishing Technology, **Shri M.V. Baiju** and **Dr. V.R. Madhu**, Senior Scientists participated in the 2013 ICES FAO Working Group on Fish Technology and Fish Behaviour (WGFTFB) Meeting at Bangkok, Thailand during 6-9 May, 2013. Dr. Leela Edwin presented an invited paper on "CIFT's Initiatives towards Green Fishing Systems" at the meeting.

Dr. C.N. Ravishankar, Head, Fish Processing served as Resource Expert in Fish Processing Technology in World Bank Global Food Safety Partnership (GFSP) training

programme on Good Aquaculture Practices at Suralaya, Indonesia during 17-22 June, 2013.



Photo 1- Dr. T.K. Srinivasa Gopal and Dr. Nikita Gopal with Prof. Sungchul C. Bai, President, KOSFAS and Prof. Jeong-Yeol Lee, Chair, Local Organization Committee, 10th AFAF

Photo 2- Dr. Femeena Hassan making her presentation



Dr. Leela Edwin, Shri M.V. Baiju and Dr. V.R. Madhu with Mr. Mike Pol, Co-Chair FAO-WGFTFB at SEAFDEC, Thailand



Participants and resource persons of the programme (Sitting at extreme left is Dr. Ravishankar)





Union Minister Visits CIFT, Cochin

Honourable Minister of State for Agriculture & Food Processing, Government of India Shri Tariq Anwar visited CIFT, Cochin on 27 May, 2013. The Minister was received by Dr. T.K. Srinivasa Gopal, Director, CIFT. The Honourable Minister visited the different Divisions of the Institute and showed keen interest in the technologies developed at CIFT. He appreciated the facilities created at the Business Planning and Development (BPD) Unit for developing entrepreneurship in fishing industry by utilizing the technologies developed at CIFT.

The visit to the Divisions was followed by a meeting of the Minister with the scientists and staff of CIFT. The

meeting started with the ICAR song. Dr. T.K. Srinivasa Gopal delivered the presidential address and briefed the august guest on the Institute activities. He also welcomed Shri P. Gopinath, Member, Institute Management Committee of CIFT who accompanied the Honourable Minister. In his address, the Chief Guest Shri Tariq Anwar lauded the scientists of CIFT for their untiring efforts in developing appropriate technologies that have immensely benefited small scale fishers to multi billion rupee exporting seafood industry. Finally, he urged the scientists to continue the good work for the development of the country. The meeting came to an end with a formal vote of thanks by Dr. S. Balasubramaniam, Head, EIS Division.



Honourable Minister addressing the scientists and staff



Minister being briefed on the activities of Biochemistry & Nutrition Division



Minister in Microbiology, Fermentation Biotechnology Division

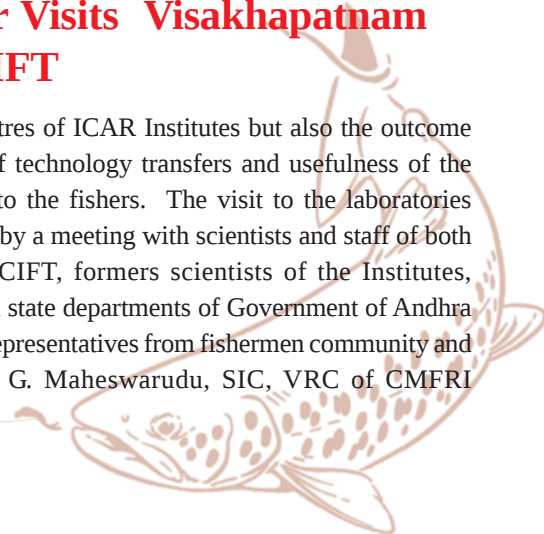


Minister in Fishing Technology Division

Union Minister and Rajya Sabha Member Visits Visakhapatnam Research Centre of CIFT

Honourable Minister of State for Agriculture & Food Processing, Govt. of India Shri Tariq Anwar was on an official visit to the Regional Centres of CIFT and CMFRI, Visakhapatnam on 11 May, 2013. Shri Tariq Anwar was accompanied by Hon'ble Member of Rajya Sabha Shri T. Subba Rami Reddy. The dignitaries visited the laboratories of both CMFRI and CIFT. The Minister showed keen interest not only in the technologies developed at these

Regional Centres of ICAR Institutes but also the outcome in the form of technology transfers and usefulness of the technologies to the fishers. The visit to the laboratories was followed by a meeting with scientists and staff of both CMFRI and CIFT, former scientists of the Institutes, Officials from state departments of Government of Andhra Pradesh and representatives from fishermen community and industry. Dr. G. Maheswarudu, SIC, VRC of CMFRI





Shri Tariq Anwar addressing the scientists and staff of the Centres

delivered the welcome address and presented the research activities of the Centre. Dr. M.M. Prasad, SIC, CIFT Visakhapatnam Research Centre briefed the visiting dignitaries about the research activities of CIFT. The Chief Guest then addressed the gathering. Guest of honour Shri



Hon'ble Minister being briefed about the fishing gear designed at CIFT

T. Subba Rami Reddy commended the scientists for the technologies developed at the Centres and their usefulness to the fishers, especially of Andhra Pradesh region. Meeting came to a conclusion with vote of thanks from Dr. M.M. Prasad.

CIFT, Cochin Signs Consultancy Agreements

CIFT, Cochin signed a series of consultancy agreements with various firms during the quarter under report. The details are furnished as under:

1. With M/s. Mahindra & Mahindra, Powerol Division, Mumbai - 400 101 for validation of diesel engine for fishing vessel application on 29 May, 2013 (Consultancy fee - ₹2,22, 500/-)
2. With M/s. V.V. Biotech Pvt. Ltd., Flat No. 404, Dhruva Apartment, Chavali Street, Ongole - 523 001, Andhra Pradesh for technical assistance and guidance on extraction of chitin and chitosan from prawn shell waste (Consultancy fee - ₹1,00,000/-)
3. With M/s. Ernakulam Regional Co-operative Milk Producers Union Ltd. (MILMA), Edappally, Cochin

- 682 024 for technical guidance and setting up of a laboratory with NABL accreditation status at Products Dairy, Edappally on 4 June, 2013 (Consultancy fee - ₹1,50,000/-)



Handing over of the signed MoU to MILMA

Awards and Recognitions

ZTM-BPD Unit, CIFT won the National Award for Best Agri-Business Incubator for the year 2013

The Zonal Technology Management-Business Planning and Development (ZTM-BPD) Unit at CIFT, Cochin has won the National Award for "Best Agri-Business Incubator" for the year 2013. The Award was instituted by Network of Indian Agri-Business Incubators (NIABI), to recognize the achievements of the Business Planning and Development Units for their performance excellence and the incubatees for their dedication in setting up successful agribusiness ventures. NIABI is an initiative of Indian Council of Agricultural Research (ICAR) and

National Agricultural Innovation Project (NAIP).

The Award was presented by Shri Kanna Lakshminarayana, Minister for Agriculture, Andhra



Dr. C.N. Ravishankar and Dr. T.K. Srinivasa Gopal receiving the award





Pradesh to Dr. T.K. Srinivasa Gopal, Director, CIFT and Dr. C.N. Ravishankar, Principal Investigator, ZTM-BPD Unit during AgriTex 2013 held at Hyderabad on 25 April, 2013. Last year ZTM-BPD Unit, CIFT was presented with the "Best Incubatee Award" for Shri Sultan Singh, Karnal, Haryana during NIABI 2012 held at New Delhi.

Recognition to Dr. Nikita Gopal

Dr. Nikita Gopal, Senior Scientist, CIFT, Cochin received the Asian Fisheries Society Merit Award for her work in Gender in Fisheries. The Award was presented on 30 April, 2013 during the inaugural function of the 10th Asian Fisheries and Aquaculture Forum held at Yeosu in South Korea. The Forum was held during 30 April to 4 May, 2013. Dr. Nikita has also participated in the 4th Global



Dr. Nikita Gopal receiving the award from Dr. Meryl Williams, Former Director General, World Fish Centre

Symposium on Gender in Aquaculture and Fisheries (GAF4) which was held as part of the Forum and was the Chair of the Programme Committee of the GAF4 in which 25 papers were presented and delegates from 16 countries participated. As part of GAF4, four special International Workshops were also held.

Recognition to Shri Prasanna Kumar

Shri M. Prasanna Kumar, Technical Assistant, Visakhapatnam Research Centre of CIFT participated in the Hindi Essay and Debate competition organized by the Town Official Language Implementation Committee (TOLIC) of Visakhapatnam. Shri Prasanna Kumar received the first prize in the competition.



Shri Prasanna Kumar receiving the prize from Shri A.K. Shrivastav, Deputy Director (OL), Bangalore

Research Advisory Committee Meeting

The Meeting of the Research Advisory Committee of CIFT was held on 27 April, 2013. The Committee was chaired by Dr. K. Devadasan, former Director, CIFT with the following members: Dr. A.K. Upadhyay, Professor and Head, Fish Processing Technology, College of Fisheries, G.B. Pant University of Agriculture and Technology, Pant Nagar, Uttarakhand; Dr. C. Hridyanathan, former Director, School of Industrial Fisheries, Cochin University of Science and Technology,

Cochin; Dr. V. Venugopal, former Scientific Officer, Bhabha Atomic Research Centre, Mumbai; Dr. C.K. Mukherjee, Professor, Department of Aquaculture, Indian Institute of Technology, Kharagpur and Dr. Madan Mohan, Assistant Director General (Marine Fisheries), Indian Council of Agricultural Research, New Delhi. Dr. P. Pravin, Principal, Scientist, CIFT was the Member Secretary. The meeting was attended by the Director and Heads of Divisions of CIFT.



RAC Meeting in progress

Institute Research Council Meeting

The Institute Research Council (IRC) under the Chairmanship of Dr. T.K. Srinivasa Gopal, Director met during 27-29 May, 2013 to discuss the progress in the

ongoing research programmes as well as to finalize the research projects for the year 2013-14. The house discussed in detail the 13 ongoing research projects five new projects,





IRC Meeting in progress

five concluded projects and the various ad hoc research projects. Presentations were also made on the visits of Scientists abroad to attend training programmes, symposia etc. The following are the new in-house projects approved for initiation during the year 2013-14:

1. Nano technological intervention to mitigate fishing craft and gear material degradation - Dr. P. Muhamed Ashraf
2. Reduction of environmental impact from trawling systems through by-catch reduction technologies and



Participants of the IRC Meeting

development of region specific sustainable fishing systems for east coast of India - Dr. R. Raghu Prakash

3. Thermal and non-thermal technologies for processing and packaging of fish products - Dr. J. Bindu
4. Risk assessment of emerging food-borne pathogens and chemical residues in aquatic systems - Dr. S. Sanjeev
5. Species specific technologies for the improved utilization of seafood resources of Maharashtra region - Dr. S. Vishnuvinayagam

CIFT Foundation Day Celebrations

The Institute celebrated its 56th Foundation Day on 29 April, 2013. The day was also celebrated as Agricultural Education Day. To commemorate the day, the Institute organized an "Open House" in the forenoon. The Institute remained open for the public to get acquainted with the activities and achievements of the premier Institute. The expert scientists and technicians of the organization facilitated the visit of large number of students from the Kendriya Vidyalaya in an around Cochin.

Shri Hibi Eden, MLA, Ernakulam Constituency was the Chief Guest of the Foundation Day Celebrations. Speaking on the occasion Shri Hibi Eden emphasized on the need for a separate Ministry of Fisheries at the Central level. He also reiterated that the interests of the people in the fisheries sector should be taken care when we think of development in a city like Cochin. The technologies developed by research institutes like CIFT has a great role in bringing out a sea change in the prosperity of fishermen as well as fish based industrialists.

Dr. Krishna Rao, retired Principal Scientist, Shri N.S. Prabhu and Smt. Annamma Varghese, retired Asst. Administrative Officers of CIFT were honoured during the function. Dr. Krishna Rao and Smt. Annamma Varghese offered felicitations. Cash Awards to meritorious wards of CIFT employees were also be distributed during the function. The meeting was presided over by Dr. P.T. Lakshmanan, Head, Biochemistry & Nutrition Division & Director Incharge, CIFT. Dr. Leela Edwin, Head, Fishing Technology welcomed

the gathering while Shri R. Anil Kumar, Senior Administrative Officer Incharge proposed a vote of thanks. The function was followed by a variety entertainment programme.



Students being explained in 'Open House'



Shri Hibi Eden delivering the inaugural address



Entertainment programme being performed





Hindi Workshop

A one day Hindi Workshop on "Computer application in Hindi" was conducted at the Visakhapatnam Research Centre of CIFT on 28 June, 2013 for the benefit of staff members. The Workshop was inaugurated by Dr. M.M Prasad, SIC of the Centre. Shri Y. Srinivas, Assistant Director (OL), Income Tax Department was the resource person.



Inauguration of the Hindi workshop (L to R: Shri Y. Srinivas, Dr. M.M Prasad and Dr. Santhosh Alex)

Radio Talks

The following radio talks were delivered by the Scientists and Technical Officers during the quarter:

1. Dr. P.T. Lakshmanan, Head, Biochemistry and Nutrition Division - Protective effect of selenium against tumour/cancer through fish (In Malayalam), AIR, Kochi (26 April, 2013)
2. Dr. George Ninan, Senior Scientist - Value addition in fisheries (In Malayalam), AIR, Kochi (2 May, 2013)
3. Dr. B. Madhusudana Rao, Senior Scientist - Nutritional significance of Godavari Hilsa (In Telugu), AIR, Visakhapatnam (20 June, 2013)

4. Shri V. Radhakrishnan Nair, Scientist - Role of GIS in development of fisheries sector (In Malayalam), AIR, Kochi (3 May, 2013)
5. Dr. M.S. Kumar, Tech. Officer (T7-8) - Synthetic fishing gear material - Protection from weathering conditions (In Telugu), AIR, Visakhapatnam (26 June, 2013)

VIP Visits

Dr. Arun Kumar Srivastava, Assistant Director of Archives, National Archives of India, Pondicherry visited CIFT, Cochin during 17-18 April, 2013.

Forthcoming Event

Short Training Course on 'Marketing Research for Value Chain in Fisheries'

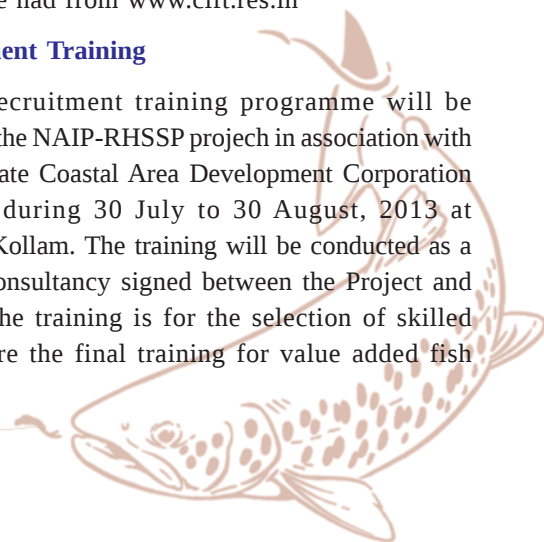
An ICAR Short Course on 'Marketing Research for Value Chain in Fisheries' will be organized at CIFT, Cochin during 1-10 October, 2013. The Training Course is intended to give the participants an exposure to the tools of marketing research which can be used within a value chain framework. The course includes a mix of theoretical, interactive and practical sessions including hands-on use of tools learnt. Besides the host Institute, faculty are drawn from other ICAR Institutes, Government Organizations and the Private Sector. The content includes concepts, methods of marketing research, supply chain analysis and management, forecasting tools, export markets and competitiveness, issues in domestic and export marketing, ICT and GIS applications, Market Decision Support Systems etc.

The Course Director is Dr. Nikita Gopal, Senior Scientist and Dr. S. Balasubramaniam, HOD, EIS is the Course Co-Director. Dr. J. Charles Jeeva, Senior

Scientist, Shri V. Radhakrishnan Nair and Shri V. Chandrasekar, Scientists are the Course Co-ordinators. Scientists, R&D personnel, Teachers and Researchers in the field of fisheries with at least two years of experience in teaching/research/extension and who possess a Master or Doctoral degree in Fisheries or Social Science (Economics, Extension, Management or relevant disciplines) are eligible to attend. Further details can be had from www.cift.res.in

Pre-recruitment Training

A pre-recruitment training programme will be organized by the NAIP-RHSSP project in association with the Kerala State Coastal Area Development Corporation (KSCADC) during 30 July to 30 August, 2013 at Nalapakam, Kollam. The training will be conducted as a part of the consultancy signed between the Project and KSCADC. The training is for the selection of skilled labours before the final training for value added fish processing.





Personnel News

Participation in Seminars/Symposia/Workshops etc.

□ Dr. T.K. Srinivasa Gopal, Director, Dr. P.T. Lakshmanan, HOD, B&N, Dr. Leela Edwin, HOD, FT, Dr. K.V. Lalitha, HOD, MFB, Dr. T.V. Sankar, HOD, QAM, Dr. S. Balasubramaniam, HOD, EIS, Dr. C.N. Ravishankar, HOD, FP, Dr. M.M. Prasad, SIC, Visakhapatnam, Dr. S. Vishnuvinayagam, SIC, Mumbai, Dr. S. Sanjeev, Shri P.K. Vijayan, Shri M. Nasser, Dr. Saly N. Thomas, Dr. P. Pravin, Dr. K. Ashok Kumar, Dr. Suseela Mathew, Dr. M.P. Remesan, Dr. G. Rajeswari, Principal Scientists, Dr. R. Raghu Prakash, Dr. U. Sreedhar, Dr. G.K. Sivaraman, Dr. Femeena Hassan, Dr. V. Geethalakshmi, Dr. S. Ashaletha, Dr. Sanjoy Das, Dr. Nikita Gopal, Dr. R. Anandan, Dr. George Ninan, Dr. A.A. Zynudheen, Dr. J. Bindu, Dr. P. Muhamed Ashraf, Shri M.V. Baiju, Dr. Toms C. Joseph, Dr. B. Madhusudana Rao, Dr. J. Charles Jeeva, Dr. S.K. Panda, Dr. V.R. Madhu, Senior Scientists, Dr. L.N. Murthy, Dr. K.K. Asha, Shri V. Radhakrishnan Nair, Dr. C.O. Mohan, Shri V. Chandrasekar, Shri Ankur Nagori, Shri A.K. Jha, Smt. Arathy Ashok, Dr. V. Murugadas, Shri C.G. Joshy, Smt. S.J. Laly, Dr. A. Jeyakumari, Dr. P.K. Binsi, Kum. Jesmi Debbarma, Smt. V. Renuka, Smt. S. Remya, Smt. P. Viji, Dr. K.K. Prajith, Dr. Niladri Sekhar Chatterjee, Smt. U. Parvathy, Scientists, Dr. A.R.S. Menon, Tech. Officer (T9), Shri C.R. Gokulan, Smt. K. Beena, Shri B.K. Pradhan, Tech Officers (T7-8), Smt. P.K. Shyma, Dr. G. Usha Rani, Dr. B. Ganesan, Shri P.S. Babu, Shri T.V. Bhaskaran, Smt. K.K. Kala, Tech. Officers (T6), Smt. G. Remani, Tech. Officer (T5), Shri P.A. Aneesh, Jr. Lab. Asst. (T3), Shri Nitin Singh, Business Manager, Shri K.K. Santhosh, Pilot Plant Engineer, Shri P. Vineeth Kumar, Shri M. Kiran Das, Smt. K.A. Anju, Smt. A. Razia Mohamed, Kum. Biji Kadavil, Shri Jijimon, Shri T. Jose Fernandez, Shri P.H. Dhiju Das, Shri P.M. Vipin, Shri P.S. Muhammed Sherif, Shri P.T. Sreejith, Shri C.K. Kamalakanth, Smt. K.A. Sayana, Shri Renju Ravi, Shri V.R. Kiran, Shri Paresh S. Khanolkar, Kum. E.S. Sumi, Shri F. Daniel Raj, Shri Rithin Joseph, Shri P. Shameer, Shri V.G. Jinoy, Shri K.A. Roshan, Shri Shiran Kalappurakkal, Kum. P. Sruthi, Smt. S. Soma, Kum. Jolsna Jeevan, Shri R. Navaneethan, Shri K.K. Ajeeshkumar, Shri K.V. Vishnu, Shri B.P. Bijulal, Shri Jomey George, Kum. N.B. Jayasree, Smt. K. Shyni, Smt. G.S. Hema, Kum. K.R. Remyakumari, Shri C.T. Nithin, Shri T.R. Ananthanarayanan, Shri U. Sumith, Kum.

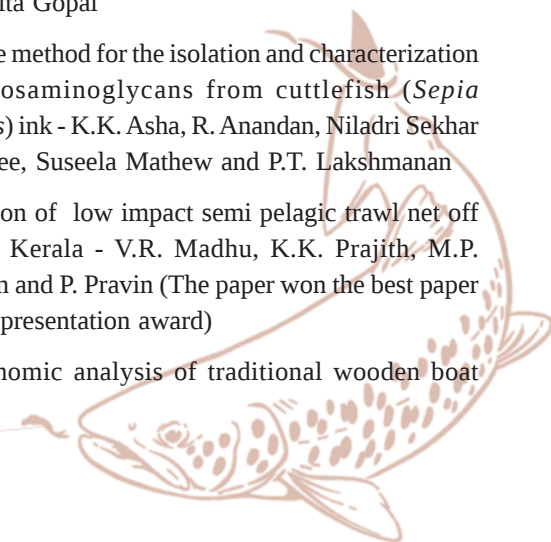
P. Minu, Kum. V.P. Souda, Shri Rahul Ravindran, Shri M.M. Lijin Nambiar, Kum. Nimisha V. Satheesh, Shri Jinu Krishnan, Kum. E.R. Priya and Shri K.R. Midhun, Research Fellows - International symposium on Greening fisheries - Towards green technologies in fisheries, Cochin (21-23 May). The following papers were also presented by them in the Symposium:

1. The need for green fishing systems for Indian waters - Leela Edwin (Lead Talk)
2. Socio-economic variables associated with technology adoption among motorized fishermen and policy implications - S. Balasubramaniam, J. Charles Jeeva, S. Ashaletha and C.G. Joshy
3. Bacteriological quality of dry cured and bioprocessed fish products sold in dry fish markets of Assam - M.M. Prasad
4. Smoke curing of fish: COFISKI - A case study as green kiln - M.M. Prasad
5. Seasonal variation in bacteriological quality of cured fish in twin cities markets of Andhra Pradesh - M.M. Prasad, B.M. Rao, L.N. Murthy and Jesmi Debbarma
6. Acceptability of cured marine fish products in hinterland areas - M.M. Prasad, B.M. Rao, L.N. Murthy and Jesmi Debbarma
7. Seasonal changes in the sulphite reducing clostridia level in fishes of Maharashtra coast - S. Vishnuvinayagam, P.K. Binsi, P. Viji, R. Chakrabarti, Thriveni G. Adiga, C.G. Joshy and K.V. Lalitha
8. Development and quality evaluation of a canned product from rohu (*Labeo rohita*) steaks in instant curry medium - P.K. Vijayan, K. Bibin, George Ninan and A.A. Zynudheen
9. Polyamide (nylon) monofilament gillnets and monolines: A threat to marine biodiversity - Saly N. Thomas, Gipson Edappazham and B. Meenakumari
10. Long lining from modified Pablo boats off Lakshadweep seas - P. Pravin, M.V. Baiju, R. Raghu Prakash, M. Baiju, P.S. Khanolkar and K.V. Aneesh Kumar
11. Tissue distribution and elimination of furazolidone in giant freshwater prawn *Macrobrachium rosenbergii* - K. Ashok Kumar, S.K. Panda, K.R. Salin and C. Mohanakumaran Nair



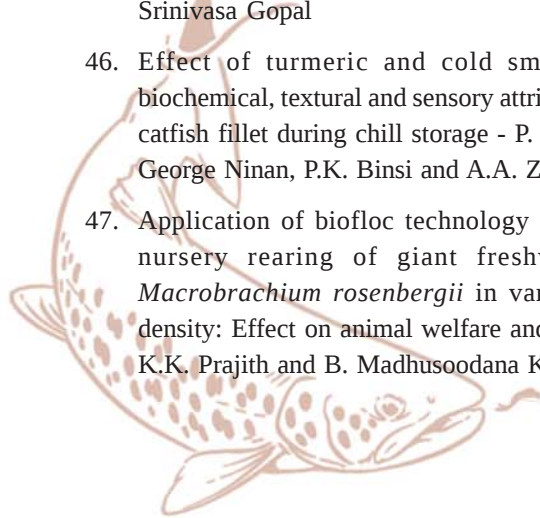


12. Hook and line fishing method for exploitation of tuna fish along Visakhapatnam coast of Andhra Pradesh - G. Rajeswari, R. Raghu Prakash and U. Sreedhar
13. Measures for reducing indiscriminate capture of hilsa juveniles in bag nets - M.P. Remesan, P. Pravin, V.R. Madhu, R.K. Manna and A.K. Sahoo
14. Quality changes in formalin treated oil sardine (*Sardinella longiceps*) during chilled storage - Femeena Hassan and T.V. Sankar
15. Green house gas emission and energy use - A case study of Kerala fish processing sector - V. Geethalakshmi, Manoj Kumar and K.A. Martin Xavier
16. Microbial quality of myctophid fishes of the Arabian sea - Sanjoy Das, T. Jose Fernandez, K.V. Lalitha and M.R. Boopendranath
17. Revisiting the co-management experiment in traditional fisheries in Kerala - Nikita Gopal
18. Quality and shelf life of coated nuggets prepared from oleoresin treated meat of Black clam (*Villorita cyprinoids*) in chill stored condition - George Ninan, A.A. Zynudheen, M. Sreejith and C.N. Ravishankar
19. Standardization and quality evaluation of fish roll prepared from meat of rohu (*Labeo rohita*) stored under chilled conditions - A.A. Zynudheen, George Ninan, Sumayya Kalam, C.G. Joshy and C.N. Ravishankar
20. Experimental evaluation of effect of silage based foliar spray on biometric and yield characteristics of ladies finger (*Abelmoschus esculentus*) - A.A. Zynudheen, George Ninan, C.G. Joshy and C.N. Ravishankar
21. Effect of high pressure on shucking and quality of edible oyster (*Crassostrea madrasensis*) meat during chill storage at 2 ± 1 °C - J. Bindu, C.K. Kamalakanth, J. Ginson, K.K. Asha, Sanjoy Das and T.K. Srinivasa Gopal
22. Distribution of abundance and diversity parameters of deep sea fishes along the west coast of India - U. Sreedhar, G.V.S. Sudhakar, M.V. Hanumantha Rao, R. Raghu Prakash and G. Rajeswari
23. Microbial quality profile of salt dried marine fishes from Veraval, Gujarat - G.K. Sivaraman, R. Badonia, C.O. Mohan, A.K. Jha, V. Renuka and S. Remya
24. Microbial quality of effluent discharged from fish processing industry at Bhidia landing site, Veraval, Gujarat - G.K. Sivaraman, C.O. Mohan, A.K. Jha, V. Renuka, S. Remya, R. Badonia, K.V. Lalitha, C.N. Ravishankar and T.K. Srinivasa Gopal
25. Fuel saving in fishing vessel construction and operation - M.V. Baiju
26. Microbial chitinases - Studies with *Vibrio* species - B. Madhusudana Rao and K.V. Lalitha
27. Resistance of *E. coli* and *Salmonella* isolated from marine and freshwater fishes towards Carbapenem - B. Madhusudana Rao, L.N. Murthy, D. Jesmi and M.M. Prasad
28. Ecosystem based management of harvest and post harvest losses: A case study in reservoir fisheries - J. Charles Jeeva and V. Geethalakshmi
29. Anti bacterial screening of plant extracts for potential application in seafood industry - S.K. Panda, V.M. Reshma Mol, K.K. Asha, K. Ashok Kumar, T.V. Sankar and S. Sanjeev
30. Application of organic acids in extension of chilled storage life of Indian squid, *Loligo duvauceli* Orbigny - S.K. Panda, M.A. Sathar, V. Ashique, K. Ashok Kumar, S. Sanjeev and T.V. Sankar
31. Policy interventions for sustainable empowerment of women in coastal ecosystem: A participatory assessment - J. Charles Jeeva, Jolsana Jeevan, S. Soma and P.J. Antony Sijo
32. Nutritional composition, hazards profiling and quality of commercial feeds used in *Litopenaeus vannamei* hatcheries and farms of Andhra Pradesh - L.N. Murthy, B. Madhusudana Rao, R. Anandan, Suseela Mathew, P.T. Lakshmanan and M.M. Prasad
33. Mapping of fisheries infrastructure using Geo-spatial technology - V. Radhakrishnan Nair, V. Geethalakshmi and Nikita Gopal
34. A simple method for the isolation and characterization of glycosaminoglycans from cuttlefish (*Sepia pharonis*) ink - K.K. Asha, R. Anandan, Niladri Sekhar Chatterjee, Suseela Mathew and P.T. Lakshmanan
35. Evaluation of low impact semi pelagic trawl net off Cochin, Kerala - V.R. Madhu, K.K. Prajith, M.P. Remesan and P. Pravin (The paper won the best paper - Oral - presentation award)
36. An economic analysis of traditional wooden boat





- building activities in Veraval, Gujarat - V. Chandrasekar and Nikita Gopal
37. Antimicrobial activity of gold nanorods prepared by seed mediated sequential growth process - A.K. Jha, G.K. Sivaraman, C.O. Mohan, S. Remya, P. Muhammed Ashraf and R. Badonia
 38. Green house gas emission from seafood processing plant of Veraval, Gujarat - A.K. Jha, C.O. Mohan, G.K. Sivaraman, S. Remya, V. Renuka and R. Badonia
 39. Effect of reduced oxygen atmosphere on quality and shelf life of Longtail tuna (*Thunnus tonggol*) - C.O. Mohan, S. Remya, G.K. Sivaraman, C.N. Ravishankar, R. Badonia and T.K. Srinivasa Gopal
 40. Development and validation of solar fish dryer for eco-friendly and hygienic drying of fish and fish products - Ankur Nagori, P.N. Joshi and C.N. Ravishankar
 41. Impact of introduction of Pacific white shrimp (*Litopenaeus vannamei*): Stakeholder analysis in Andhra Pradesh - Arathy Ashok, L.N. Murthy, Jesmi Debbarma, B.M. Rao, M.M. Prasad, V. Geethalakshmi and Nikita Gopal
 42. Prevalence of Methicillin-resistant coagulase positive *Staphylococcus* in fishery environments of Kerala - V. Murugadas, Toms C. Joseph and K.V. Lalitha
 43. The chemical contaminants and water quality in the shrimp farms of Edavanakkadu area, Cochin - S.J. Laly, K. Ashok Kumar and T.V. Sankar
 44. Microencapsulation of fish oil-milk based emulsion by spray drying: Impact on oxidative stability - A. Jeyakumari, D.C. Kothari and G. Venkateshwarlu
 45. Conversion of fish scale into bioactive and bioceramic hydroxyapatite and its characterization - P.K. Binsi, A.A. Zynudheen, George Ninan, P. Ashraf, S. Vishnuvinayagam, P. Viji, C.N. Ravishankar and T.K. Srinivasa Gopal
 46. Effect of turmeric and cold smoking on the biochemical, textural and sensory attributes of striped catfish fillet during chill storage - P. Viji, S. Tanuja, George Ninan, P.K. Binsi and A.A. Zynudheen
 47. Application of biofloc technology in the primary nursery rearing of giant freshwater prawn, *Macrobrachium rosenbergii* in varying stocking density: Effect on animal welfare and seed quality - K.K. Prajith and B. Madhusoodana Kurup
 48. Development of a QuEChERS based rapid method for determination of organochlorine pesticides in shrimp by Gas Chromatography-ECD - Niladri Sekhar Chatterjee, R. Anandan, Suseela Matew, K.K. Asha, G. Usha Rani and P.T. Lakshmanan
 49. Studies on effect of different processing methods on textural properties of *Litopenaeus vannamei* and *Penaeus monodon* cultured along Andhra Pradesh coast - Jesmi Debbarma, L.N. Murthy, B.M. Rao and M.M. Prasad
 50. Effect of air blast and brine freezing on quality changes of giant tiger prawn (*Penaeus monodon*) - S. Remya, C.O. Mohan, G.K. Sivaraman, C.N. Ravishankar, T.K. Srinivasa Gopal and R. Badonia
 51. Effect of cryoprotectants on the frozen storage stability of fish mince - U. Parvathy, M.M. Jibina and Sajan George
 52. Comparison of nutrient profiling of myctophid fishes (*Diaphus effulgens* and *D. hudsoni*) with common Indian food fishes - T. Jose Fernandez, K. Pradeep, R. Anandan, A.A. Zynudheen and T.V. Sankar
 53. Upward trend in the size and power of ring seine fishing systems of Kerala - P.H. Dhiju Das, P.S. Muhammed Sherif, P.T. Sreejith, K.A. Sayana, V.R. Madhu, M.V. Baiju and Leela Edwin
 54. Optimization of high pressure processing parameters of yellow fin tuna (*Thunnus albacares*) steaks using response surface methodology - C.K. Kamalakanth, J. Ginson, C.G. Joshy, J. Bindu, K.K. Asha and T.K. Srinivasa Gopal (The paper won the best paper - Poster - award)
 55. Studies on long line fishing method of southern India - P.M. Vipin, Renju Ravi, Saly N. Thomas, P. Pravin and Leela Edwin
 56. Sapphire: A new material for large mesh drift gillnet (Jada Jal) operated in Mangrol, Gujarat - P.S. Muhammed Sherif, P.T. Sreejith, K.A. Sayana, Saly N. Thomas, M.P. Remesan and Leela Edwin
 57. Structural changes in the mechanized fishing fleet operating off Kerala, India - Renju Ravi, P.M. Vipin, M.R. Boopendranath, C.G. Joshy and Leela Edwin
 58. Investigating the nutrient profiling of common small pelagic fishes available in Indian south-west coast waters for amelioration of malnutrition and age associated disorders - E.S. Sumi, R. Anandan, K.V.





Lalitha, M. Nasser, S. Ashaletha, V. Geethalakshmi and S. Sanjeev

59. A simple and cost effective method for the preparation of fatty acid ethyl esters from sardine oil and its comparative evaluation with sunflower oil and coconut oil - E.S. Sumi, R. Anandan, K.V. Lalitha, M. Nasser, S. Ashaletha, V. Geethalakshmi and S. Sanjeev
60. Comparative analysis on the fatty acid profile of fish oil extracted and purified from *Diaphus watasei* with sardine oil - R. Navaneethan, R. Anandan, T. Jose Fernandez, Suseela Mathew and T.V. Sankar
61. Extraction and characterization of gelatin from the processing waste of Doublespotted queenfish (*Scomberoides lysan*), Malabar grouper (*Epinephelus malabaricus*) and Bearded croaker (*Johnius amblycephalus*) - K. Shyni, G.S. Hema, George Ninan, Suseela Mathew, C.G. Joshy and P.T. Lakshmanan
62. Comparative studies of collagen obtained from skin of two species of fishes Doublespotted queenfish (*Scomberoides lysan*) and Malabar grouper (*Epinephelus malabaricus*) - G.S. Hema, K. Shyni, Suseela Mathew, George Ninan and P.T. Lakshmanan
63. Biochemical profiling of two species of squids (*Sthenoteuthis oualaniensis* and *Loligo duvauceli*) from the Arabian sea - K.R. Remyakumari, P.A. Aneesh, K.K. Asha, R. Anandan, Suseela Mathew, Niladri Sekhar Chatterjee and P.T. Lakshmanan
64. Supercritical carbon dioxide extraction of PUFA rich oil from freeze dried tuna red meat - C.T. Nithin, Suseela Mathew, R. Yathavamoorthi, T.R. Ananthanarayanan, J. Bindu, R. Anandan and T.K. Srinivasa Gopal
65. Utilization of tuna waste silage as a novel pig feed ingredient - R. Yathavamoorthi, C.T. Nithin, Suseela Mathew, T.R. Ananthanarayanan, J. Bindu, R. Anandan and T.K. Srinivasa Gopal
66. Antioxidant defense of dietary squalene supplementation on N-3 poly unsaturated fatty acids (PUFA)-mediated oxidative stress in young and aged rats - T. Obulesu, R. Anandan, Suseela Mathew, B. Ganesan and P.T. Lakshmanan
67. Salubrious effects of dietary supplementation on squalene and N-3 polyunsaturated fatty acids concentrate on mitochondrial function in young and aged rats - T. Obulesu, R. Anandan, Suseela Mathew,

P.T. Lakshmanan, Gopalakrishnan and W.S. Lakra

68. Development of Pangasius catfish steaks canned in oil medium - Nimisha V. Satheesh, Stephanie Listel, P.K. Vijayan and George Ninan
69. Fish catch variability in north east Arabian sea with reference to ENSO - Nimit Kumar, V.R. Madhu and B. Meenakaumari (The paper won the best paper - Poster - award)

□ **Dr. T.K. Srinivasa Gopal**, Director, **Dr. T.V. Sankar**, HOD, QAM, **Dr. K. Ashok Kumar**, Principal Scientist, **Dr. Nikita Gopal** and **Dr. S.K. Panda**, Senior Scientists - Brainstorming session on SPS (Sanitary and Phtosanitary) measures, NAAS, New Delhi (27 June). The following talks were also delivered by them in the Session:

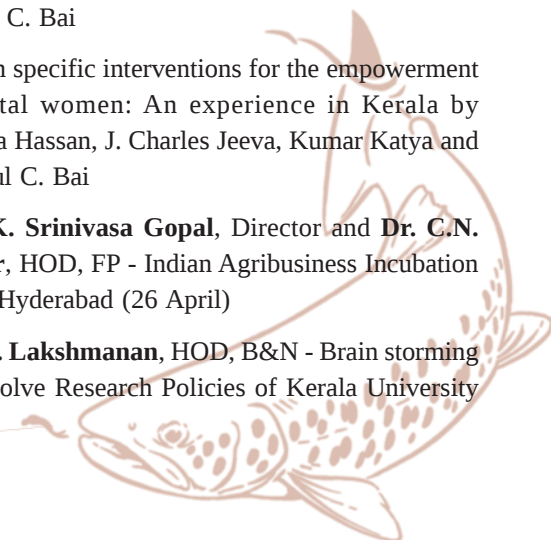
- i. SPS measures - An overview - Dr. T.V. Sankar
- ii. SPS - The perspective of industry - Dr. K. Ashok Kumar
- iii. Issues related to regulation and testing SPS parameters in fish and fishery products - Dr. S.K. Panda

□ **Dr. T.K. Srinivasa Gopal**, Director, **Dr. Nikita Gopal** and **Dr. Femeena Hassan**, Senior Scientists - 10th Asian Fisheries and Aquaculture Forum, Yeosu, South Korea (30 April - 4 May). The following research papers were also presented by them in the Forum:

1. Extraction of gelatin from Yellowfin tuna skin by T.K. Srinivasa Gopal
2. Transformation in gender roles with changes in traditional fisheries in Kerala, India by Nikita Gopal, Leela Edwin and B. Meenakumari
3. Reduction of *Vibrio parahaemolyticus* (ATCC 17802) in edible oyster *Crassostrea madrasensis* (Preston) during depuration under laboratory condition by Femeena Hassan, T.V. Sankar, Kumar Katya and Sunchul C. Bai
4. Location specific interventions for the empowerment of coastal women: An experience in Kerala by Femeena Hassan, J. Charles Jeeva, Kumar Katya and Sunchul C. Bai

□ **Dr. T.K. Srinivasa Gopal**, Director and **Dr. C.N. Ravishankar**, HOD, FP - Indian Agribusiness Incubation Conference, Hyderabad (26 April)

□ **Dr. P.T. Lakshmanan**, HOD, B&N - Brain storming session to evolve Research Policies of Kerala University





of Fisheries and Ocean Studies, Cochin (23 April)

❑ **Dr. P.T. Lakshmanan**, HOD, B&N - Technical sub committee meeting of Council for Food Research and Development (CFRD), Cochin (10 June)

❑ **Dr. Leela Edwin**, HOD, FT - Academic Council Meeting of KUFOS, Cochin (13 May)

❑ **Dr. Leela Edwin**, HOD, FT, **Shri M.V. Baiju**, Senior Scientist and **Dr. V.R. Madhu**, Scientist - 2013 ICES-FAO Working Group on Fish Technology and Fish Behaviour (WGFTFB) Meeting at Bangkok, Thailand (6-9 May). Dr. Leela Edwin presented an invited paper on "CIFT's Initiatives Towards Green Fishing Systems" at the Meeting.

❑ **Dr. C.N. Ravishankar**, HOD, FP - Review meeting for evaluating proposals for establishing Business Planning and Development Unit, ICAR, New Delhi (1 April)

❑ **Dr. C.N. Ravishankar**, HOD, FP - Launch workshop of the BPD, CPCRI, Kasaragod (7 June)

❑ **Dr. C.N. Ravishankar**, HOD, FP - World bank Global Food Safety Partnership training programme on Good aquaculture practices, Suralaya, Indonesia (17-22 June) (As resource person)

❑ **Dr. C.N. Ravishankar**, HOD, FP and **Smt. A. Razia Mohammed**, RA - STEM Annual Summit, Chennai (15-17 May)

❑ **Dr. M.M. Prasad**, SIC, Visakhapatnam - 21st Meeting of the ICAR Regional Committee No. III, AAU, Jorhat, Assam (15-16 April)

❑ **Dr. M.M. Prasad**, SIC, Visakhapatnam - Meeting of AQUADIRECT.ORG, Visakhapatnam (15 May)

❑ **Dr. M.M. Prasad**, SIC, Visakhapatnam - Training programme on Fish post harvesting to the active fisherwomen, Pudimadaka (20 June) (As resource person). Dr. Prasad gave the inaugural lecture in the programme.

❑ **Dr. M.M. Prasad**, SIC, Visakhapatnam, **Dr. G. Rajeswari**, Principal Scientist, **Dr. R. Raghu Prakash**, Senior Scientist and **Kum. Jesmi Debbarma**, Scientist - Scientific Committee on Oceanic Research (SCOR) Meeting at Center for Studies on Bay of Bengal, Visakhapatnam (17 May)

❑ **Shri P.K. Vijayan**, Principal Scientist - Executive committee meeting of NIFAM, Thiruvananthapuram (27 April)

❑ **Dr. Saly N. Thomas**, Principal Scientist - First sitting

of the Expert Committee constituted by Matsyafed for the implementation of new fish net factory, Thiruvananthapuram (20 June)

❑ **Dr. P. Pravin**, Principal Scientist - Meeting regarding Tuna long line training programme for Tamil Nadu fishermen, CIFNET, Cochin (17 June)

❑ **Dr. P. Pravin**, Principal Scientist and **Shri M.V. Baiju**, Senior Scientist - Meeting of Expert Committee for Fish wealth and scientific study, Govt. of Kerala, Thiruvananthapuram (11 June)

❑ **Dr. P. Pravin** and **Dr. K. Ashok Kumar**, Principal Scientists - Workshop on Development of digital knowledge repository for fisheries, Cochin (29-30 April)

❑ **Dr. Suseela Mathew**, Principal Scientist - Fisheries expert's brain storming session, Fisheries College and Research Institute, Thoothukudi (19 June)

❑ **Dr. A.A. Zynudheen**, Senior Scientist - National symposium on Chitosan, CSIR-IHBT, Palampur (7-8 June). Dr. Zynudheen delivered a Lead Talk on 'Extraction and applications of chitin and its derivatives from aquatic resources' in the Symposium.

❑ **Dr. George Ninan**, Senior Scientist - International seminar cum workshop on Mud crab aquaculture and fisheries management, Rajiv Gandhi Centre for Aquaculture, Sirkazhi (10-12 April). Dr. Ninan also presented a paper entitled, 'Live storage, chemical composition, processing and value addition of mud crab (*Scylla serrata*)' by George Ninan, A.A. Zynudheen, C.N. Ravishankar and T.K. Srinivasa Gopal.

❑ **Dr. George Ninan**, Senior Scientist - Technical programme discussion meeting, BARC, Mumbai (25 April)

❑ **Dr. George Ninan**, Senior Scientist - NAIP training programme for the CPI and CoPI's of the new BPD units, TNAU, Coimbatore (19 June). Dr. George Ninan took a class on 'Planning, monitoring and evaluation of the incubator' in the training programme.

❑ **Dr. George Ninan**, Senior Scientist - National seminar on Promotion of fisheries and upliftment of fisheries, Cochin (14 June). Dr. George Ninan delivered a talk on 'Post harvest value addition and diversified product development in fisheries', in the Seminar.

❑ **Dr. U. Sreedhar**, Senior Scientist - Training on Coastal and marine biodiversity conservation, Kakkinada (6 April) (As resource person). Dr. Sreedhar gave a lecture on 'Changes in the marine fishing practices along the east



coast with special reference to Visakhapatnam and Kakkinada coast'.

❑ **Dr. P. Muhamed Ashraf**, Senior Scientist - Meeting of the PI's of Southern ocean projects, NCAOR, Vasco (8 May)

❑ **Dr. S. Ashaletha** and **Dr. J. Charles Jeeva**, Senior Scientists - Brain storming session on Improving research in agricultural extension: Issues and way forward, TNAU, Coimbatore (26 April)

❑ **Shri M.V. Baiju**, Senior Scientist - Meeting of Expert Committee for Fish wealth and scientific study, Govt. of Kerala, Thiruvananthapuram (2 May & 22 June)

❑ **Dr. V. Murugadas**, Scientist - Training programme on Laboratory quality management system and internal audit as per IS/ISO/IEC 17025, NITS, Noida (7-10 May)

❑ **Dr. A.R.S. Menon**, Tech. Officer (T9) - Inter Media Publicity Coordination Committee meeting, Doordarshan Kendra, Thiruvananthapuram (3 May)

❑ **Dr. A.R.S. Menon**, Tech. Officer (T9) - Workshop on Right to Information Act - 2005 for PIO's, ISTM, New Delhi (27-28 May)

❑ **Dr. M.S. Kumar**, Tech. Officer (T7-8) - Farm and home rural unit programme sub committee meeting, AIR, Visakhapatnam (6 May)

❑ **Smt. T. Silaja** and **Shri K.D. Jos**, Tech. Officers (T6) - Training programme on Competency enhancement for Technical Officers (T5 and above), NAARM, Hyderabad (13-23 May)

❑ **Dr. Santhosh Alex**, Tech. Officer (T6) - Hindi workshop, MPEDA, Visakhapatnam (27-28 June) (As resource person)

Personalia

Appointments

1. Shri Gaihimngam Kamei, Scientist, Fisheries Resource Management, Cochin
2. Smt. U. Parvathy, Scientist, Fish Processing Technology, Cochin
3. Shri P.A. Aneesh, T3 (Lab Asst.), Cochin
4. Shri K.A. Noby Varghese, T3 (Lab Asst.), Cochin
5. Shri J. Saju, T3 (Jr. Engineer) (Electrical & Mechanical), Cochin
6. Shri V. Vipin Kumar, T3 (Jr. Engineer) (Naval Architecture), Cochin
7. Kum. Priyanka S. Vichare, T3 (Tech. Asst.), Mumbai
8. Kum. Vineetha Das, T3 (Lab. Asst.), Cochin
9. Shri P.J. Davis, SAO, Cochin
10. Kum. Megha Chopra, Asst., Cochin

Transfers

1. Dr. Rakesh Kumar, Senior Scientist, CIFT, Cochin to NDRI, Karnal
2. Shri B.K. Pradhan, Tech. Officer (T7-8), Burla to

Cochin

3. Dr. P. Shankar, Tech. Officer (T5), Cochin to Veraval

Retirements

1. Smt. K.P. Leelamma, Tech. Officer (T5), Cochin
2. Smt. A.A. Cousalia, Asst., Cochin
3. Shri Y. Kanaka Raju, Asst., Visakhapatnam
4. Shri S. Appa Rao, UDC, Visakhapatnam
5. Shri M.N. Sreedharan, SSS, Cochin

Resignations

1. Shri C. Vishnu, Assistant (On Probation), Cochin
2. Smt. Neelima Besra, SSS, Visakhapatnam

OBITUARY

We mourn the untimely and sad demise of Shri R.N. Sahoo, T-I-3 (Driver, Launch), CIFT, Cochin on 5 May, 2013. May the departed soul rest in peace.