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ICAR-Central Institute of Fisheries Technology

(Indian Council of Agricultural Research) Willingdon Island, Matsyapuri P. O., Kochi - 682 029 (An ISO/IEC 17025-2017 NABL Accredited & ISO 9001-2015 Certified Institute)



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प्रस्तावना

भाकृअनुप-केंद्रीय मात्स्यिकी प्रौद्योगिकी संस्थान, कोचिन, मत्स्य प्रग्रहण और पश्च प्रग्रहण प्रौद्योगिकी के क्षेत्र में अनुसंधान और विस्तार के लिए समर्पित है यह संस्थान सीधे मात्स्यिकी क्षेत्र की प्रौद्योगिकी आवश्यकताओं का समाधन कर रहा है और मछुआरों और महिलाओं की आजीविका को संबलित कर रहा है। मात्स्यिकी, भारतीय अर्थव्यवस्था के सबसे तेजी से बढ़ते क्षेत्रों में से एक है। इस क्षेत्र में विभिन्न हितधारकों की मांग को पूरा करने के लिए उभरती और अग्रणी प्रौद्योगिकियों के अनुप्रयोग के माध्यम से विविधीकरण के प्रयास किए गए हैं।

यह वार्षिक रिपोर्ट 2021, जनवरी से दिसंबर 2021 की अवधि के दौरान संस्थान की उपलब्धियों पर प्रकाश डालती है। हितधारकों के द्वारा महसूस की गयी जरूरतों के आधार पर क्षेत्रीय विकास के लिए प्रौद्योगिकियों और इसके अनुप्रयोग को अनुसंधान गतिविधियों में महत्व दिया जाता है, प्रौद्योगिकियों को स्थानांतरित किया जाता है और उचित अनुवर्ती कार्रवाई की जाती है ताकि यह लाभ अंतिम उपयोगकर्ताओं तक पहुंचे। वैज्ञानिक उपलब्धियों को अंतर्राष्ट्रीय और राष्ट्रीय दोनों समकक्ष समीक्षा पत्रिकाओं में भी प्रकाशित किया गया और संस्थान के वैज्ञानिकों ने विभिन्न मंचों के माध्यम से विचार-विमर्श में भाग लिया।

इस अवधि के दौरान परामर्श परियोजनाएं, सहयोगात्मक अनुसंधान, अनुबंध सेवा और अनुबंध अनुसंधान के माध्यम से लगभग 31 प्रौद्योगिकी हस्तांतरित किए गए।

मुझे यह साझा करते हुए खुशी हो रही है कि भाकृअनुप-के मा प्रौ सं के वैज्ञानिकों को इस अवधि के दौरान कई सम्मान और मान्यताएं मिले। हमारे एक वैज्ञानिक को वर्ष 2021 के लिए राष्ट्रीय कृषि वैज्ञानिक अकादमी का प्रतिष्ठित फेलो प्रदान किया गया। अन्य प्रतिष्ठित पुरस्कारों में कृषि पर्यावरण विकास सोसायटी के अंतर्राष्ट्रीय सम्मेलन में सर्वश्रेष्ठ मात्स्यिकी वैज्ञानिक पुरस्कार और कृषि और प्रौद्योगिकी में वैज्ञानिक विकास संस्था के युवा वैज्ञानिक पुरस्कार शामिल हैं। हमारे दो वैज्ञानिकों ने वर्ष 2021 के लिए प्रसिद्ध इन्सा विजिटिंग साइंटि स्ट फेलोशिप भी प्राप्त किया। इसके अतिरिक्त, संस्थान के वैज्ञानिकों को विभिन्न वैज्ञानिक सम्मेलनों, संगोष्ठियों और विचारगोष्ठियों में वैज्ञानिक पुरस्कारों सहित कई अन्य मान्यताएं भी प्राप्त हुए।

संस्थान से भाकृअनुप और अन्य राष्ट्रीय और अंतर्राष्ट्रीय निधिकरण एजेंसियों द्वारा वित्त पोषित दोनों मूल और अनुप्रयुक्त अनुसंधान परियोजनाओं का संचालन हुआ। इस अवधि के दौरान 29 भाकृअनुप वित्त पोषित (संस्थान) अनुसंधान परियोजनाएं और 23 बाह्य वित्त पोषित परियोजनाएं संचालित की गयी। परियोजना के क्रमविकास चरणों के दौरान परियोजना के विषय हितधारक और उद्योग की बातचीत से निर्गत हुए हैं। वर्ल्ड फिश सेंटर द्वारा वित्त पोषित परियोजना वंचित ग्रामीण आबादी के लिए पोषण खाद्य सुरक्षा के मुद्दे को संबोधित करती है। मत्स्य समाविष्ट प्रोटीन युक्त कार्यात्मक खाद्य और परियोजना में विकसित आयरन फोर्टिफाइड सूप किशोर लड़कियों के कुपोषण के मुद्दे को संबोधित करता है। FAO द्वारा वित्त पोषित एक अन्य महत्वपूर्ण परियोजना, महामारी विज्ञान और संचरण की गतिशीलता को समझने की दृष्टि से, प्रतिसूक्ष्मजीवी प्रतिरोध की आपतन को देखती है। यह परियोजना जनसंख्या के स्वास्थ्य पर सीधा प्रभाव डालती है और इसका विशेष महत्व है। अन्य परियोजनाओं में एक स्वास्थ्य और उपयोगकर्ता संचालित समाधानों के लिए निदान पर इंडो-यूके परियोजना, स्वीडिश वित्त पोषित लिंग और समुद्री शैवाल मूल्य श्रुंखला, वर्ल्ड वाइड फंड फॉर नेचर - भारत द्वारा वित्त पोषित परियोजना CIFT-TED पर जागरूकता बढ़ाने के लिए सम्मिलित हैं।



ट्रॉलरों में ईंधन कार्यक्षमता बढ़ाने के लिए स्लॉटेड वी-फॉर्म ओटर बोर्ड को परिकल्पित, संरचित करके परीक्षण किए गए। परीक्षण से पता चला कि ईंधन की अधिक कार्यक्षमता और इसके परिणाम में कार्बन उत्सर्जन में कमी हुई। झींगा कवच से प्राप्त कार्बन नेनो डॉट्स सम्मिलित पेंट एंटीकोर्सिव पेंट्स और फ्लोरेसेंस एमिटर में उपयोगी पाए गए। अन्य उल्लेखनीय उत्पादन में जलाशय मात्स्यिकी में अनुप्रयोग के लिए पेडल बोट का विकास और मछुआरों द्वारा प्रचालन के लिए एक टिकाऊ नारियल लकड़ी की डोंगी की परिकल्पना और विकास सम्मिलित हैं।

पश्च प्रग्रहण क्षेत्र में, जीवित मत्स्य का परिवहन, उद्योग की एक अत्यधिक जरूरी आवश्यकता है और भाकृअनुप-के मा प्रौ सं ने मत्स्य के हाइपोर्थार्मक एनेस्थेटिज़िंग के लिए एक स्वचालित शीतलन प्रणाली और स्यूडो हाइबरनेशन के तहत जीवित मत्स्यों के जलरहित परिवहन के लिए एक प्रौद्योगिकी भी विकसित की है। उम्मीद की जा रही है कि यह दोनों ही उद्योग के लिए काफी उपयोगी सिद्ध होंगे। मूल्यवर्धन और अपशिष्ट को धन में बदलने के क्षेत्र में, विकसित प्रौद्योगिकियों में मत्स्य के छिलके से हाइड्रोक्सी ऐपिटाइट और कार्बन नेनो डॉट्स के सहसंश्लेषण के लिए एक प्रक्रिया, औद्योगिक काइटोसन से मध्यम चिपचिपा काइटोसन, एंजाइम आधारित पीलिंग प्रणाली से झींगा प्रसंस्करण, कम तापमान सीलिंग गुणों वाली हरी समुद्री शैवाल संवेष्ट न फिल्म और गुणवत्ता मूल्यांकन के लिए समुद्री शैवाल आधारित कार्यात्मक सैशे शामिल हैं।

समुद्री शैवाल से फ्यूकोक्सैन्थिन के उत्पादन के लिए एक वाणिज्यिक रूप में तैयार प्रौद्योगिकी का विकास, चारे में फाइटिक अम्ल के लिए एक गैर-विनाशकारी पद्धति का विकास, लगभग 250 संदूषकों के लिए एलसीएमएस/जीसीएमएस आधारित बहुअवशेष पद्धति का विकास, मत्स्य और कवच मत्स्य प्रजातियों में फॉर्मलडिहाइड पर एक आंकडा आधार का विकास और विश्लेषणात्मक प्रयोगशालाओं के अनुप्रयोग के लिए प्रतिजैविक अवशेषों के लिए क्यूटीआरएपी एमएस आधारित पद्धति का विकास इस अवधि के दौरान अन्य प्रमुख उपलब्धियां हैं।

मल्टी-लोकस सीक्वेंस टाइपिंग (एमएलएसटी) द्वारा *साल्मोनेला पार्टीफी* बी टाइपिंग, समुद्री खाद्य से एरोमोनास एसपीपी से चयनित प्रतिजैविक पदार्थ के लिए जीन कोडिंग की पहचान जैव प्रौद्योगिकी में कुछ महत्वपूर्ण योगदान थे। भाकृअनुप-केमाप्रौसं ने झींगा, चारा और पानी में प्रतिजैविक अवशेषों का पता लगाने के लिए एक किट भी विकसित की है जिसका क्षेत्र परीक्षण किया जा रहा है। सौर ऊर्जा से चलने वाले रेफ्रिजरेटेड फिश वेंडिंग कियोस्क का एक उन्नत संस्करण और गर्म हवा की सहायता से निरंतर इन्फ्रारेड शुष्कन के लिए एक वाणिज्यिक मॉडल प्रसंस्करण मशीनरी विकास में उल्लेखनीय योगदान हैं। अनुप्रयुक्त और मूल अनुसंधान के अतिरिक्त, भाकृअनुप-के मा प्रौ सं मछुआरों और अन्य हितधारकों के लाभ के लिए मछुआरों के सामाजिक आर्थिक पहलुओं, प्रौद्योगिकी अभिग्रहण, लिंग के मामले, विपणन रणनीतियों आदि पर आंकडा उत्पन्न करने में महत्वपूर्ण योगदान दे रहा है।

भाकृअनुप-केमाप्रौसं को हितधारकों और उद्योग से लगातार समर्थन मिल रहा है और हमें देश में मात्स्यिकी क्षेत्र में योगदान करने में सक्षम बनाने के लिए उनका निरंतर समर्थन मिलने की उम्मीद है।

भाकृअनुप के मात्स्यिकी प्रभाग द्वारा दी गई सहायता को कृतज्ञतापूर्वक आभार प्रकट किया जाता है। मैं भाकृअनुप-केमाप्रौसं के कर्मचारियों के प्रयासों की सराहना करती हूँ जिनकी कड़ी मेहनत से संस्थान का नाम कायम है और उनके योगदान को निष्ठा से अभिस्वीकृत करती हूँ।

leeloddu लीला एड्विन

निदेशक

PREFACE_

ICAR-Central Institute of Fisheries Technology, Cochin dedicated to research and extension in the field of harvest and post-harvest technology of fish, has been directly addressing the technology needs of the fisheries sector and supporting the livelihood of fishermen and women. Fisheries is one of the fastest-growing sectors of the Indian economy. There have been efforts in diversification through application of emerging and frontier technologies to meet the demands of the different stakeholders in the sector.

The Annual Report 2021, highlights the achievements of the Institute during the period January to December 2021. The technologies and its application for sectoral development based on felt needs of stakeholders are given importance in research activities undertaken. The technologies are transferred and due follow up is carried out so that the benefits reach the end users. The scientific achievements have also been published in both International and National peer reviewed journals and the scientists of the Institute participated in deliberation through different fora.

During the period, about 31 technology transfers have taken place through Consultancy Projects, Collaborative Research, Contract Service and Contract Research.

I am happy to share that the scientists of ICAR-CIFT received a number of laurels and recognitions during the period. One of our scientists was conferred the prestigious fellow of National Academy of Agricultural Scientists for the year 2021. Other prestigious accolades received include Best Fisheries Scientist award in the International Conference of the Agro Environmental Development Society and Young Scientist awards of the Society for Scientific Development in Agriculture & Technology. Two of our scientists also received the famous INSA visiting Scientists Fellowship for the year 2021. Besides, the scientists of the institute also received a number of other recognitions including scientific awards in various scientific conferences, seminars and symposia.

The institute operated both basic and applied research projects funded by ICAR and other National and International funding agencies. There were 29 ICAR funded (institute) research projects and 23 externally funded projects in operation during the period. Project themes have emanated from the stakeholder and industry interaction during the evolution stages of the project. The project funded by World Fish Centre addresses the issue of Nutritional Food Security for deprived rural population. Fish incorporated protein rich functional food and iron fortified soup developed in the project addressed the issue of malnutrition issues of adolescent girls. Another important project funded by FAO looks at incidence of Anti-Microbial Resistance, with the view to understand the epidemiology and transmission dynamics. The project has direct implications on the health of the population and assumes special importance. Other projects include the Indo-UK project on diagnostics for one health and user driven solutions, Swedish funded gender and the seaweed value chain, World Wide Fund for Nature - India funded project for enhancing awareness on CIFT-TED.



Slotted V-form otter boards for increasing fuel efficiency in trawlers was designed, fabricated and introduced. Field testing revealed considerable fuel efficiency and resultant reduction in carbon emission. Carbon nano dots obtained from prawn shell incorporated paints were found to have useful applications in anticorrosive paints and fluorescence emitters. Other notable outputs include the development of a pedal boat for application in reservoir fisheries and the design and development of a durable coconut wood canoe for operation by fishermen.

In the post-harvest sector, live fish transportation of fish is a much-needed requirement of the industry and ICAR-CIFT has developed an automated cooling system for hypothermic anesthetizing of fish and also a technology for waterless transportation of live fish under pseudo hibernation. It is expected that both will be very useful for the industry. In the area of value addition and conversion of waste to wealth, technologies developed includes a process for co-synthesis of hydroxyappetite and carbon nano dots from fish scale, medium viscosity chitosan from industrial chitosan, enzyme based peeling system in shrimp processing, a green seaweed packaging film with good low temperature sealing properties and seaweed based functional sachet for quality evaluation.

Development of a commercial ready technology for the production of fucoxanthin from seaweed, development of a non-destructive method for phytic acid in feed, development of a LCMS/ GCMS based multiresidue method for about 250 contaminants, development of a database on the formaldehyde in fish and shellfish species and development of a QTRAP MS based method for antibiotic residues for application of analytical laboratories are other salient achievements during the period.

Salmonella partyphi B typing by multi-locus sequence typing (MLST), identification of gene coding for selected antibiotics from Aeromonas spp from seafood were some of the important contributions in biotechnology. ICAR-CIFT also has developed a kit for detection of antibiotic residues in shrimp, feed and water which is being field tested. An improved version of solar powered refrigerated fish vending kiosk and a commercial model for hot air assisted continuous infrared drying are the notable contributions in processing machinery development. In addition to applied and basic research, ICAR-CIFT is contributing significantly in generating data on socio-economic aspects of the fisherfolk, technology adoption, gender issues, marketing strategies etc, for benefiting the fishers and other stakeholders.

The ICAR- CIFT has continued to receive support from the stakeholders and industry and we hope to get their continued backing to enable us to contribute to the fisheries sector in the Country.

The support given by the Fisheries Division of ICAR is gratefully acknowledged. I appreciate the efforts of the staff of the ICAR-CIFT whose hard work sustain the name of the Institute and sincerely acknowledge their contributions.

Leela Edwin

Director

कार्यकारी सारांश

भाकृअनुप-केंद्रीय मात्स्यिकी प्रौद्योगिकी संस्थान, कोचिन, की स्थापना प्रग्रहण और प्रसंस्करण तकनीक के क्षेत्र में नवोन्मेषी अनुसंधान द्वारा मात्स्यिकी संपदाओं के कुल उपयोग को संपोषणीय बनाने के उद्देश्य से किया गया है, एवं यह संस्थान, मत्स्य प्रग्रहण एवं प्रसंस्करण, जैवरसायन, सूक्ष्म जैविकी, जैव प्रौद्योगिकी आदि के क्षेत्रों में, विस्तार गतिविधियों द्वारा उपयोगकर्ता तक संस्थान के शोध परिणामों को प्रसारित करने के लिए अधिकृत है।

संस्थान के बिभिन्न गतिविधियों एवं निष्पादित कार्यों को समझने के लिए जनवरी 2021 से दिसंबर 2021 के बीच संस्थान के प्रमुख शोध उपलब्धियों इस प्रकार हैं।

- नव विकसित आंशिक द्वि-खांचित 'V' सदृश ओटर बोर्ड के प्रारंभिक परिक्षण से ज्ञात हुआ की विकसित ओटर बोर्ड के प्रयोग से प्रति बर्ष 25 से 30 मिलियन लीटर ईंधन बचाया जा सकता है और यदि भारत के 70 से 80% ट्रालर नव विकसित आंशिक द्वि-खांचित 'V' सदृश ओटर बोर्ड का प्रयोग करें तो प्रति बर्ष 50 से 60 मिलियन किलोग्राम कार्बन उत्सर्जन को कम किया जा सकता है।
- कॉर्बन नेनो डॉट की मदद से बाहरी उपयोग के लिए UV सोखनेवाले सूती कपड़ों का विकास किया गया जो कि 30 बार पानी से साफ किया जा सकता है।
- झींगा कवच से निष्कर्षित बिस्फेनोल-इपोक्सि पॉलीमर मिश्रित कॉर्बन नेनो डॉट का परिक्षण मत्स्यन यान में प्रयुक्त स्टील में किया गया एवं उनमे नियंत्रित अवस्था की तुलना में ज्यादा क्षय अवरोध गुण पाया गया।
- पॉली अमाइड नेटिंग पर कार्बन नेनो डॉट के लेपन से अति उत्कृष्ट प्रतिदीप्ति देखा गया एवं इसका उपयोग समुद्र में नष्ट जाल को खोजने में किया जा सकता है।
- समुद्री मत्स्यों (सियानिड) के रेटिनल एबसोरपशेन स्पेक्ट्रा को मीठे पानी के मर्छलियों से अलग चिन्हित किया गया जांचे गए सभी मर्छलियों का अधिकतम अवशोषण स्पेक्ट्रम बैंगनी क्षेत्र के 400 nm पर पाया गया।
- जलाशयों में मत्स्यन के लिए एफ.आर.पी. पेडल बोटों (3m LOA) का अभिकल्प और निर्माण किया गया और परिक्षण के लिए इन्हें केरल के पीची स्थित अनुसूचित जाति/जनजाति मात्स्यिकी सहकारिता समिति को सौंपा गया।
- नारियल की लकड़ी से बने एक डोंगी (8m LOA) को साउथ एशिएन फिशरमेन फ्रेटेरनिटि, कोलेचिल, तमिलनाडु को गुणवत्ता मूल्यांकन के लिए सौंपा गया।
- छोटे स्तर के रिंग सीन मात्स्यिकी के लिए मार्गनिर्देशिका एवं परामर्शिका तैयार किए गए जिसमें विशेष रूप से पेलाजिक संपदाओं के संपोषणीय प्रग्रहण पर ध्यान दिया गया है और इसे प्रभावी रूप से कार्यान्वयन के लिए बिभिन्न राज्य सरकारों को सूचित किया गया है।
- उपभोक्ता के पौष्टिक जरूरतों को ध्यान में रखते हुए, माल्ट किए गए अनाज एवं एलो टूना रेड मीट के जैव सक्रिय पेपटाइड से एक स्वास्थ्य पेय तैयार किया गया।
- कीटोमोरफा प्रजाति से हरा समुद्री शैवाल आधारित संवेष्ठन फिल्म विकसित किया गया जो निम्न तापमान में अच्छा सीलिंग गुण दर्शाया।
- मत्स्य शल्क से हैड्रोक्सिपेटाइट और कॉर्बन नेनो डॉट के सह-संश्लेषण के लिए एक प्रक्रिया विकसित किया गया।
- भारत के मत्स्य आहार के जैव रासायनिक एवं पौष्टिक संयोजन के लिए फेसाइल वेब आधारित सूचना पद्धति को अभिकल्प और विकसित किया गया।

- औद्योगिक काइटिन से मध्यम विस्कोसिटी कैटोसन वाले प्रसंस्करण तकनीक को विकसित किया गया और इसे सफलतापूर्वक उधोगों को हस्तांतरित किया गया।
- O अल्पताप सम्बेदनहीन स्थिति में मत्स्य के जिंदा परिवहन के लिए एक स्वचालित कूलिंग पद्धति को विकसित किया गया।
- भारत के 28 जगहों से 152 फिन मत्स्य और 2929 कवच मत्स्य के नमूनों में फोरमाल्डीहैड के स्वाभाविक स्तर को प्रलेखित किया गया।
- मत्स्य में कुल फ्लोरफेनिकोल अवशेष को ज्ञात करने का तरीका विकसित किया गया जो कि फ्लोरफेनिकोल और उसके अमाइन, ओक्सोलिनिक अम्ल, एनरोफलोक्सिन, सिप्रोफलोक्सिन और QTRAP मास स्पेक्ट्रोमेट्री का योगफल है।
- वाणिज्यपरक रूप में महत्वपूर्ण फिन मत्स्य और कवच मत्स्य के 240 प्रजातियों में भारी धातु और ट्रेस धातु के 3616 नमूनों को संकलित किया गया और मानकों के निर्माण के लिए इसे एफ.एस.एस.ए.आई को प्रस्तुत किया गया।
- मत्स्य और मात्स्यिकी उत्पाद में बहुश्रेणी कीटनाशक अवशेष के निर्धारण के लिए तरीका विकसित किया गया।
- मत्स्य और मात्स्यिकी उत्पादों के लिए FOODOCOEPIA का विकास किया गया।
- फूकोजांतिन जो कि समुद्री शैवाल का एक उच्च मूल्य संघटक है, इसके औद्योगिक उत्पादन के लिए तकनीक तैयार किया गया।
- चूहों में परीक्षणात्मक रूप में इनड्यूस किए गए मेटाबोलिक सिंड्रोम में मत्स्य तेल के अनुपूरण से इनसूलिन संवेदनशीलता में सुधार आया।
- एफ.टी.आई.आर. द्वारा आहार घटक और जलीय आहार से फैटिक अम्ल के आकलन के लिए एक गैर विनाशक तरीके को स्तरीयकृत किया गया।
- ग्रेट हेमर हेड शार्क के चमडे के अपशिस्ट से कोलैजन पेपटाइड के इन विवो गैर लिपिडेमिक और गैर आक्सीकारक संभावनाओं को का निष्कर्षण किया गया।
- लिक्युड क्रोमेटोग्राफी टेनडेम मास स्पेक्टोमेट्री और गेस क्रोमेटोग्राफी टेनडेम मास स्पेक्टोमेट्री द्वारा 250 लक्षित संदूषकों के लिए बहुअवशेष तरीका विकसित किया गया।
- सालमोनेल्ला पाराटैफी B को समुद्री आहार से मल्टी लोकस सीक्वेन्स टैपिंग (एम एल एस टी) द्वारा टाइप किया गया।
- सिल्वर नानो कणों को हरी प्रौद्योगिकी द्वारा सिट्रस नींबू के सहारे संशलेषित किया गया. यह कम तापमान में वी मिमिकस के विकास को रोकने में सहायक है।
- हेटेरोफोबिक जीवाणु और टेट्रासैक्लीन प्रतिरोध जीवाणु को निष्क्रीय बनाने के लिए फेनटोन रिएजेंट प्रभावकारी पाया गया।
- बहु दवा प्रतिरोध जीवाणु से इ कोली के को-कल्चर से इ कोली ने ट्रान्स्कोजुएंट सिप्रोलोक्सिन, क्लोरामफेनिकोल, कोट्राइमोक्सेल, एरिथ्रोमैसिन और ओक्सी टेट्रासैक्लीन के लिए प्रतिरोध अर्जित किया।
- समुदी आहार के 6.3% नमूनों में विब्रियो मिमिकस पाया गया और वे मजबूत बायोफिल्म उत्पादक थे।
- समुद्री आहार से पृथक किए गए आरकोबेक्टर प्रजाति के जीन कोडिंग में टेट्रासैकलोन, सल्फोनामैड, क्लोरांमफेनिकोल और क्यूनोलोन्सव इंटेग्रोन 1 और 2 मौजूद थे और आरकोबेक्टर प्रजाति में वयरूलेन्स जेनेसिया B, mviN, cadF, pldA और cj1349 की उपस्थिति का पता चला।
- जलकृषित झींगा, मत्स्य चारा में पाये जाने वाले एमपिसिलिन, अमोक्सीिलीन, कारपेनिसिलिन, सेफालोथिन, सेफोक्सिटिन, सेफाजोलिन और क्लोक्सासिलिन के प्रतिजैविक अवशेषों को जांचने के लिए उपलब्ध डिपिकोलोनिक अम्ल को अनुकूलित किया गया। वर्त्तमान में इसका मूल्यांकन, झींगा कृषक, मत्स्य प्रसंस्करण उद्योग और एमपीइडीए, कोचिन के द्वारा किया जा रहा है।

- सबसे प्रचलित MRSA का प्रतिरोध प्रोफाइल agr III किस्म के साथ एमपिसिलिन-सेफाजोलिन-सेफोक्जिटिन-जेनटामैसिन-नोरफलोक्सासिन-ओक्सालिन-पेनसिलिन था, जिसमे SCCmec-IV तत्व मौजूद था। बाजार से इकटठे किए गए नमूनों में PVL टोक्सिन जीन और ST88 के साथ spat 2526 मौजूद थे।
- असम के बाजार में ST88 SCCmec-IV (ST88-IV)MRSA की उपस्थिति से संबंधित पहले रिपोर्ट को प्रलेखित किया गया है।
- भारत के मात्स्यिकी पर्यावरण में ST88 SCCmec-IV (ST88-IV)MRSA की घटना को प्रलेखित किया गया है।
- डी सी कंप्रेसर के साथ सौर ऊर्जा से चलनेवाले प्रशीतित मत्स्य बिक्री कियोस्क के सुधारे गए संस्करण को विकसित किया गया।
- बहुउददेश्य बयोमास ड्रायर और छोटे विशल्कन मशीनों के निष्पादन को सत्यापित किया गया।
- उच्च मूल्य मात्स्यिकी उत्पादों के लिए गर्म हवा के सहारे निरंतर इनफ्रारेड शुष्कन पद्धति के लिए एक पाइलेट स्तर मॉडल को अभिकल्पित और विकसित किया गया।
- बहुउददेश्य सौर तापीय परिवर्तन पद्धति के प्रोटोटाइप को अभिकल्पित किया गया और इसको अधिष्ठापित करने के लिए स्थल का चयन किया गया।
- Ow लवण में शुष्कित हड्डीहीन टूना चिप्स के लिए प्रोटोकॉल को अनुकूलित किया गया।
- एंडोप्रोटिएस (0.25%w/v) किण्वक उपचार के प्रयोग से झींगा छीलन में सुधार देखा गया।
- 6 घंटों के लिए स्यूडोहैबरनेशन में एल वन्नेमी का जल रहित जिंदा परिवहन के साथ धीमे पुनरोद्धार से इसके जीवित रहने की संभावनाएं बढी।
- ब्रोड स्पेक्ट्रम प्रतिजैविक, टेट्रासैक्लीन (1024 ug/ml) के प्रति मीठे जल के मर्छलियों के हेटेरोट्रोफिक जीवाणु का उच्च प्रतिरोध संभावना पाया गया।
- मीठे जलकृषि पद्धति के टेट्रासैकलीन प्रतिरोध पृथक्कों में tetA सबसे ज्यादा प्रचलित प्रतिरोध जीन पाया गया।
- ए हैड्रोलिया जो कि मत्स्य और मानव के लिए संभावित जीवाणु है, 28°C, 30°C और 37°C में भिन्न प्रतिजैविक संवेदनशील स्वरुप दर्शाया।
- समुद्री शैवाल से एक क्रियाशील सैशे विकसित किया गया और उसके क्रियाशील और भौतिक रासायनिक गुणों का मूल्यांकन किया गया।
- झींगा पालन के लिए खारा पानी तालाब, मीठा पानी तालाब और मत्स्य बाजारों से प्राप्त इ कोली के एएमआर पृथकों के खिलाफ तैयार किए गए फेज काकटेल ने लिटिक प्रक्रिया को दर्शाया।
- नेशनेल सेंटर फार बयोटेक्नोलोजी इनफोरमेशन डाटा बेस में तीन कोलीफेज और एक विब्रियोफेज के होल जीनोम सीक्वेन्स डिपोजिट किये गये।
- वेरावल में अवतरित शार्क से लिए गए नमूनों से भारी धातुओं के स्वास्थ्य खतरा निर्धारण और धातु प्रदुषण इंडेक्स को प्रलेखित किया गया।
- समुद्री आहार परिरक्षण के लिए उपयोग किए जानेवाले बर्फ के 38% नमूनों में शिगा टोक्सिन जीन की मौजूदगी थी।
- एल मोनोसैटोजेन्स के पृथकों में IA, inIC, inlJ, hlyA, iap, plcA prfA नामक वयरूलेंट जीन मौजूद थे।

शोध उपलब्धियों को वैज्ञानिक प्रकाशनों, सम्मेलन और संगोष्ठियों में प्रलेखित किया गया. संस्थान द्वारा परामर्श सेवाएं, अनुबंधित शोध, प्रौद्योगिकी हस्तांतरण, विश्लेषणात्मक सेवाएं दवारा हितधारकों के आवश्यकताओं को संतुष्ट करने की पूरी कोशिश की गई है।

EXECUTIVE SUMMARY ____

The ICAR-Central Institute of Fisheries Technology, Cochin is established with the vision to facilitate sustainable harvesting and total utilization of fishery resources through innovations in harvest and post-harvest technologies. The institute is mandated to conduct basic and strategic research in fishing and processing, biochemical, microbiological, biotechnological issues associated with post-harvest technology of fish as well as it's extension across the stakeholders. The major research achievements of the institute during the period from Jan 2021 to Dec 2021, are given here for a quick understanding of the performance of the institute.

- Extensive trials conducted with the newly developed V-form double slotted otter boards showed that 25-30 million liters of diesel can be saved and 50-60 million kg of CO₂ emission can be reduced annually if 70-80% of the trawlers in India adopt CIFT V-form double slotted otter board.
- Developed a UV absorbing cotton cloth for outdoor application by incorporating nano carbon dot, with stability for 30 water washes.
- Carbon nano dot derived from prawn shell incorporated in Bisphenol epoxy polymer exhibited excellent corrosion inhibition on boat building steel than control.
- Carbon nano dot coating over polyamide netting material exhibited excellent fluorescence and likely to have application in retrieval lost nets under sea.
- The retinal absorption spectra for marine fishes (Sciaenids) tested were markedly different from freshwater fishes and all the fishes tested showed maximum absorption at around 400 nm in the violet region of the spectrum.
- Designed and constructed FRP pedal fishing boat (3 m LOA) for reservoir fishing and were handed over to Peechi SC/ST Reservoir Fisheries Co-operative Society Kerala for field trials.
- Constructed and handed over a coconut wood canoe (8 m LOA) to the South Asian Fisherman Fraternity (SAFF), Colachel, Tamil Nadu for performance evaluation.
- Guidelines/advisories were prepared for small-scale ring seine fishery with special reference to mesh size for sustainable harvest of pelagic resources and communicated to different state Governments for effective implementation.
- Formulated malted grain-based health beverage, with bioactive peptide from yellowfin tuna red meat to meet consumer-specific nutritional demands.
- Developed a green seaweed-based packaging film from *Chaetomorpha* spp. which exhibited good sealing properties at lower temperature.
- Developed a process for the co-synthesis of hydroxyapatite and nanocarbon dots from fish scale.
- Designed and developed a facile web-based information system on the biochemical and nutritional composition of food fish in India.
- Developed process technology for medium viscosity chitosan from industrial chitin and has been successfully transferred to the industry.
- O Developed an automated cooling system for hypothermic anesthetizing of fish for live transportation.
- Natural levels of formaldehyde in 152 species of finfish and shellfish comprising of 2929 samples collected from 28 locations across India was documented.

- Method developed for total Florfenicol residues in fish as sum of Florfenicol and its amine, oxolinic acid, enrofloxacin, ciprofloxacin, Sulfadimethoxine by QTRAP Mass Spectrometry.
- Heavy metal and trace mineral data of 3616 samples of 240 species of commercially important finfish and shellfish varieties were compiled and submitted to FSSAI for formulation of standards.
- Method development for the determination of multiclass pesticide residue in Fish and Fish products.
- Development of FOODOCOEPIA in Fish and Fish Products.
- Technology developed for the production of fucoxanthin, a high value component of seaweed is ready for commercialization.
- Fish oil supplementation in experimentally-induced metabolic syndrome in rats improved insulin sensitivity.
- Standardized a non-destructive method for the estimation of phytic acid from aqua feed and feed ingredient by FTIR.
- In vivo anti-lipidemic and antioxidant potential of collagen peptides was extracted from great hammerhead shark skin waste.
- A multiresidue method was developed for estimating more than 250 target contaminants by liquid chromatography tandem mass spectrometry and gas chromatography tandem mass spectrometry.
- Salmonella Paratyphi B from seafood was typed by Multi Locus Sequence Typing (MLST).
- Silver nanoparticles were synthesized through green technology by using citrus limon with potency to inhibit the growth of *V. mimicus* at very low concentrations.
- Fenton's reagent was found to be effective for the inactivation of heterotrophic bacteria and tetracycline resistant bacteria.
- Transconjugants of *E. coli* obtained by coculturing of *E. coli* with multi-drug resistant bacteria acquired resistance to ciprofloxacin, chloramphenicol, co-trimoxazole, erythromycin and oxytetracycline.
- Vibrio mimicus was present in 6.3% of seafood samples and were strong biofilm producers.
- Genes coding for tetracycline, sulphonamide, chloramphenicol, quinolones and integrons 1 and 2 were present in *Arcobacter* spp. isolated from seafood and the Virulence genes- ciaB, mviN, cadF, pldA and cj1349 were detected in *Arcobacter* spp.
- Optimized the available Dipicolinic acid (DPA) kit for the detection of antibiotic residues from aquaculture shrimp, fish feed and water for ampicillin, amoxicillin, carpenicillin, cephalothin, cefoxitin, cefazolin and cloxacillin and is under field evaluation with Shrimp farmers, Fish Processing Industry and MPEDA, Cochin.
- Most prevalent resistance profile of MRSA was ampicillin-cefazolin-cefoxitin-gentamicin-norfloxacinoxacillin-penicillin with agr III type and carry SCCmec-IV elements harbour PVL toxin genes and ST88 with spa type t2526 from the market fish samples.
- First incidence from India of ST88-SCCmec-IV (ST88-IV) MRSA in the fishery environment is documented.
- O Developed an improved version of solar-powered refrigerated fish vending kiosk with DC compressor.
- Preformation of multipurpose biomass drier and mini descaling machines were validated.

- Designed and developed a commercial pilot scale model of hot air assisted continuous infrared drying system for high value fishery products.
- Designed the prototype of a multi-purpose solar thermal conversion system and selected the site for installation of the unit.
- Protocol for low salt dried boneless tuna chips was optimized.
- Treatment of shrimp with endo-protease (0.25% w/v) enzyme improved it's peelability.
- Water less live transportation of *L. vannamei* shrimp under pseudohibernation for 6 hrs. followed by gradual revitalization resulted in improved survival.
- High resistance potential of heterotrophic bacteria from freshwater fish ponds was observed towards broad spectrum antibiotic, tetracycline (1024 µg/ml).
- tetA was found to be the most prevalent resistance genes (70.6%) among the tetacycline resistant isolates from the freshwater aquaculutre sytem.
- *A. hydrophila* that is potentially pathogenic to fish and humans showed different antibiotic susceptibility patterns at 28°C and 30°C compared to 37°C.
- Developed a functional sachet from seaweed and evaluated its functional and physicochemical properties.
- A phage cocktail prepared showed lytic activity against AMR isolates of *E. coli* obtained from brackish water shrimp farms, freshwater fish farms, fish markets.
- Whole genome sequences of three coliphages and one vibriophage were deposited in National Center for Biotechnology Information (NCBI) database.
- The metal pollution Index and health risk assessment of heavy metals in sharks landed at Veraval, was documented.
- It was reported that about 38% of ice samples used for seafood preservation harboured one or more Shiga toxin genes.
- The isolates of *L. monocytogenes* were found to possess virulent genes namely inIA, inIC, inIJ, hlyA, iap, plcA and prfA, respectively.

The research outputs were documented as peer reviewed scientific publications as well as in scientific deliberations in conferences and symposia. The institute also made good efforts to satisfy stakeholder requirements by engaging in consultancy services, contract research, technology transfers, analytical services.



THE INSTITUTE

The ICAR-Central Institute of Fisheries Technology (named at the time of inception as Central Fisheries Technology Research Station) was set-up following the recommendation of a high power committee constituted by the Ministry of Food and Agriculture, Government of India. It started functioning at Kochi on 29th April, 1957 under the Department of Agriculture of the then Ministry of Food and Agriculture with a small nucleus of staff for research work in fishing craft and gear. Other Divisions soon followed. The administrative control of the Institute was brought under the Indian Council of Agricultural Research on 01 October, 1967.

VISION

To facilitate sustainable harvesting and total utilization of fishery resources through innovations in harvest and post-harvest technologies.

OVERVIEW

The Institute is the only National Centre in the Country where Research in all disciplines relating to fishing and fish processing is undertaken. Research Centres function at Visakhapatnam (Andhra Pradesh), Veraval (Gujarat) and Mumbai (Maharashtra).

MISSION

Ensure responsible harvesting of fishery resources through eco-friendly, energy efficient and economical means; ensure total utilization of the harvested fish through appropriate processing, value addition, packaging and waste utilization; ensure food safety and nutritional security to the consumer and minimize carbon and water foot print per unit volume; and to ensure equitable benefits to the stakeholders, across the value chain.

MANDATE

- Basic and strategic research in fishing and processing, bioactive compounds and food safety.
- Design and develop energy efficient fishing systems for responsible fishing and sustainable management.
- Development of implements and machinery for fishing and fish processing.
- Consultancy services, human resource development through skill development, training, education and extension.



STAFF POSITION

ICAR-CIFT has a total staff strength of 330. Of the total staff, 28.5% are scientific personnel, 38.5% technical, 20 % administrative, 11.5% supporting staff and the rest auxiliary staff. Of the sanctioned positions in different categories, 86.2% of the scientific, 57.5% of the technical, 75.8% of the administrative, 63.2% of supporting and 40% of the auxiliary staff are in position.

STAFF POSITION

Allocation and Expenditure (Rs. in lakhs) (For the year 2021)

Budget Head	Allocation	Expenditure
Total	5146.21	5356.48







Research Achievements



Fishing Technology

Institute Projects

- Studies on fishing operations and energy use for formulation of guidelines for selected small scale fisheries of India
- Studies on resource and energy conservation in trawl systems
- Improved technologies for protection of materials in marine environment
- Studies on fish behavior as an input for developing responsible fishing systems
- Technological interventions for improvement of fishing systems in selected inland water bodies along India
- Fishing technological interventions for sustainable marine ecosystem services along the east coast of India

Most Significant Achievements

- Extensive trials using the newly developed V-form double slotted otter boards showed that 7 million liters of diesel can be saved and 19 million kg of CO₂ emission can be reduced annually if 50% of the trawlers in India adopt CIFT-V-form double slotted otter boards.
- CIFT-TED has been fine tuned as per international standards and prototypes of new TEDs (Grid I & II)
 was sent to NOAA for the dive test.
- Guidelines/advisories prepared for small-scale ring seine fishery with special reference to mesh size for sustainable harvest of pelagic resources and communicated to different state govt. for effective implementation.
- Developed a UV absorbing cotton cloth for outdoor application by incorporating nano carbon dot, which was stable even after 30 water washes.
- Carbon nano dot derived from prawn shell incorporated in Bisphenol epoxy polymer exhibited excellent corrosion inhibition on boat building steel and Carbon nano dot coating over polyamide netting material exhibited excellent fluorescence. Which can be used as tool to retrieve lost nets under the sea.



- The retinal absorption spectra for marine fishes (Sciaenids) tested were markedly different from freshwater fishes. However, all the fishes tested showed maximum absorption at around 400 nm in the violet region of the spectrum.
- Designed and constructed FRP pedal fishing boat (3 m LOA) for reservoir fishing. After successful trials, it was handed over to Peechi SC/ST Reservoir Fisheries Co-operative Society, Kerala.
- Life Cycle Assessment of purse seine fishing with light showed 15% more Global Warming Potential (GWP) in purse seiner using light than purse seiner of the same size operated in the same location without using light.
- Constructed and handed over a coconut wood canoe (8 m LOA) to the South Asian Fisherman Fraternity (SAFF), Colachel, Tamil Nadu for performance evaluation.
- Documented the structural changes in trawls and gears of Andhra Pradesh and Tamil Nadu.

CHIEF FINDINGS

Studies on fishing operations and energy use for formulation of guidelines for selected small scale fisheries of India

Principal Investigator: Dr. Leela Edwin

Fuel use in small-scale fishing sector

Survey carried out in the small-scale fishing sector along Tamil Nadu, indicated a total of 8898 fishing vessels, which 25% were gill netters, seine netters (24%), shrimp trawlers (17%), longline-cum-gill netters (16%), long liners (12%), drift gill netters (5%) and handline-cum-gill netters (1%). Multi-day seine netter showed lowest fuel use intensity (0.08) indicating better efficiency compared to other fishing systems.

Formulation of Guidelines

Guidelines/advisories prepared for small-scale ring seine fishery with special reference to mesh size for sustainable harvest of pelagic resources and communicated to different State Government for effective implementation.

Status of small-scale marine gillnet fishing in selected states of India was documented based on gear design and operational details. Various issues identified in the sector, such as increased fishing effort, bycatch issues, use of multi meshes, ALDFG (Abandoned, Lost, Discarded Fishing Gear) etc. were identified, documented and guidelines for sustainable small-scale gillnet fishing were developed.

Studies on Resource and Energy Conservation in Trawl Systems

Principal Investigator: Dr. M.P. Remesan

V-Form double slotted otter boards

Trawl telemetry study using Notus trawl sensors showed better horizontal spread for the attached trawl when V- form double slotted otter boards were used.



Demonstration of CIFT V-form double slotted otter board was held onboard a commercial trawler based at Puthiyappa fishing harbour, Kozhikode, Kerala. A pair of the new otter boards, each weighing 160 kg were handed over to the Puthiyappa Trawl Boat Operators Association for commercial operation.

Designs of CIFT V-form double slotted otter board and CIFT-collapsible fish trap were submitted for design registration

Prototypes of fine tuned CIFT-TED was fabricated and awaiting the dive test. Aluminium alloy pipe was used as replacement for stainless steel rods for the fabrication of grids of new CIFT-TED.

Designed and fabricated an Integrated Bycatch Reductio Device (IBRD) by integrating the principles of JFE-SSD, CIFT-TED, Jellyfish Excluder Device and Square mesh trawl cod end.



CIFT-TED: Grid under construction





Trawl telemetry study onboard CIFT Research Vessel MK-II



Fuel consumption meter onboard RV MK-II



Improved techniques for protection of materials in marine environment

Principal Investigator: Dr. Muhamed Ashraf P.

Fabricated a UV-absorbing cotton cloth for outdoor application by incorporating nano carbon dot, which was stable even after 30 water washings.







Control

CD + Silane

Scanning electron micrographs of cotton, silane treated and silane + carbon dot treated after 30 water wash

Application of nano carbon dot as an additive to epoxy paints

The nano carbon dot from prawn shell was reinforced in bisphenol A epoxy resin and coated over boat building steel. Electrochemical impedance analysis revealed that carbon dot - epoxy composite exhibited Rp values at 1011 Ohms cm² compared to epoxy alone (106 Ohms cm²) coated steel.







Electron micrographs of Epoxy coated and epoxy+ nano carbon dot coated steel surface

Synthesis of carbon dots from prawn shell

Synthesised carbon dot from prawn shell by using acetic acid through hydrothermal method. Spectrophotometric and FTIR studies revealed the existence of conjugated system and other characteristics for fluorescent carbon dots.



CD synthesis from prawn shell and its UV- visible spectra



Assessment of degradation pattern of fishing gear materials in different environmental conditions

Comparative assessment of degradation of HDPE twisted monofilament twine samples (0.5mm diameter) under different environmental conditions were studied. Samples were exposed to natural atmospheric conditions and estuarine conditions for a period of one year. The twines retained good strength (72.5% break force) even after immersion for one year. Percentage retention of elongation was 30.7% under estuarine conditions.



Variation in break load and elongation at break of HDPE twine samples exposed to estuarine water conditions.

Fouling intensity was assessed on nanomaterial treated aquaculture cage nets in different saline conditions. Nano CuO treated PE and nano CuO+nano TiO treated polyamide exposed in saline water showed decrease in fouling attack in treated panels but there was subsequent increase during the monsoon season. Major foulers encountered at Chavara during the study were barnacles, bryozoans, mussels and oysters.

Quantification of weathered boat building FRP $^{ m N}$

The plastics extracted from FRP disposal sites included macroplastics (21-100mm), micro plastics >5mm, glass fibers, meso plastics 21-100mm, other plastics and paint.



Contribution of micro-plastic extracted from FRP disposal sites (%)



Studies on Fish Behaviour as an input for Developing Responsible Fishing Systems

Principal Investigator: Dr. V. R. Madhu

Development of artificial bait for tuna and its stability with different binders

Conducted studies on the development of artificial tuna bait and its stability with different binders. Three different types of binders viz. Guar gum, Xanthan gum and Locust bean gum were tried.

It was observed that frozen baits at different concentration of binder were more stable (similar finding was also observed previously in case of Wheat flour, Carboxy methyl cellulose and sodium alginate).

Field trials using pentagonal shaped traps

The newly designed pentagonal shaped fish trap was field tested along the Gulf of Mannar group of Islands. The traps were operated near the Van Island and Koswari Island of Gulf of Mannar, at depth range of 5-8 m. Underwater camera were attached inside the trap for observing the fish behaviour inside the traps. The major catches were snappers, groupers, and parrot fishes. The various behaviour viz., entering and exiting, grazing, approaching mesh, not approaching mesh, schooling, scanning, away from others, swimming, biting at mesh, and puffing up were observed in the trapped fish.



Pentagonal shaped fish trap under operation

Absorbance characteristics of freshwater fishes

Fish vision is very important to understand how it behaves in relation to different fishing gears. The absorbance characteristics of the retina to different wavelengths of light using scanning spectroscopy, indicated that the absorption characteristics varied with species and with the size of the fish that were used for the experiments. The juveniles of fish were found to have a different absorption spectrum when compared to the adults. The retinal absorption spectra for marine fish





(Sciaenids) tested were markedly different from freshwater fishes. However, all the fishes tested showed maximum absorption at around 400 nm in the violet region of the spectrum.



Cannibalism in tilapia fish fingerlings during restricted feeding

Trials conducted using tilapia fish fingerlings (n=78) to assess the degree of cannibalism during restricted feeding showed the fishes should be fed ad libitum during the culture period to avoid the cannibalism and this factor needs to be considered while using the species for other behaviour related studies.



Cannibalism in tilapia fish fingerlings during restricted feeding

Technological interventions for improvement of fishing systems in selected inland water bodies of India

Principal Investigator: Dr. Sandhya K. M.

Documentation of fishing systems in selected reservoirs of India

The design and technical details of craft and gears used in Gayathri reservoir Karnataka; Pazhassi reservoir, Kerala and Sunei reservoir, Odisha were collected. In Gayathri reservoir, main fishing craft used was coracle either FRP or bamboo coracle coated with coal tar. Set gillnet made of PA monofilament (0.16-0.23 mm dia) with mesh size 20-200 mm (varied according to season and targate species) was the common gear used. In Pazhassi reservoir both FRP and bamboo coracle were commonly used. Monofilament gillnets (drift and set gillnet) with mesh sizes varying from 25 mm to 75 mm were used. Fishing with lines (without baits) and trap fishing using bamboo traps, steel wire traps were also practiced. In Sunei reservoir Odisha, set gillnets (monofilament) of mesh sizes varying from 85mm to 200mm were used. Smaller mesh sizes (45mm) were used in some patches of reservoirs by fishermen, eventhough mesh size regulation (<100mm mesh size) is in place by State Fisheries Department. Cast nets, drag nets and push nets were also used in the shallower parts of the reservoir.





Optimization of mesh sizes of gillnets by selectivity studies

Optimized mesh size for one of the most dominant species *Oreochromis niloticus* was estimated from Mangalam reservoir, Palakkad. The experimental fishing was carried out using gillnets of identical design and dimensions but with different mesh sizes. PA monofilament gillnets of mesh sizes 120, 130, 140 and 150 mm and each gillnet unit having a depth of 30 meshes and length of 35 m were used. Optimum mesh size estimated for the exploitation of *Oreochromis niloticus* was 74 mm. The common selection factor (SF) and common standard deviation (SD) estimated were 2.50 and 1.99, respectively.



Selectivity curves of O. niloticus obtained in gillnets of different mesh sizes

Pedal boat for fishing in reservoirs

Designed FRP pedal fishing boat (LOA 3 m) for reservoir fishing.





FRP Pedal boat trial operation in Cochin backwaters.



Study on design and operation of Chinese dipnets of Kerala

Documentation on the stationary dip nets of Kerala was initiated. About 2561 Chinese dipnets were under operation in the Ernakulam District and their location wise representation is given in figure. Average monthly catch from the dipnets located at Cheppanam, Panangad, Kochi was lowest in the month of September



(0.92 kg/day). Shellfish catch (1kg/day) was found to be much lower than the fin fish catch. Highest catch recorded during the period was sole (2.5 kg/day) followed by carangid (2 kg/day), *Arius* sp. (1.5 kg/day), *Leiognathus* sp. (1.18 kg/day). Highest catch of shell fish was for *Macrobrachium* sp. (1.66 kg/day) followed by *Metapenaeus dobsonii* (1.1 kg/day), *Penaeus monodon* (1.0 kg/day) and mud crab (0.75 kg/day).

Distribution of Chinese Dip Net Fishery in Ernakulam District

Design and prototype development of finfish/shellfish pots and traps

Three new designs of traps for use in inland waters were developed. First trap design was an umbrella shaped foldable trap with six circular shaped mouths, which can easily be folded and used in inshore waters. The trap was specifically designed for the North Eastern State water bodies, which is simple and easy to operate. Second type of trap comprised two rigid funnel shaped traps. The first design being a funnel shaped trap made up of iron wire mesh with three leading mouths. Two mouths position at ends of the funnel and one mouth at the centre. A bait pouch is positioned between the two mouths. The second is a longer funnel shaped trap with two flexible mouths, made up of iron mesh with the mouths made up of flexible strong PVC webbing. These traps are strong and are specifically designed for the carnivorous fishes and crustaceans which have the tendency to cut the webbing of the traps. The fabrication of these traps are in progress.

6

Fishing Technological interventions for sustainable Marine Ecosystem services along the East coast of India

Principal Investigator: Dr. R. Raghu Prakash

LCA assessment of mechanized trawlers ^N

LCA analysis was conducted for 11-13 m Trawler, gillnetter and long liner. Total Global Warming Potential (GWP) of trawler operation (for 10 days) was 6.81kg CO_2 eq. The GWP of a gillnetter and long liner were 3.88 and 3.48kg CO_2 eq.





Study on structural changes in craft and gears of Andhra Pradesh & Tamil Nadu

The overall length (LOA) of the long liners operating presently from Kakinada and Visakhapatnam ports ranged from 32 to 40 feet with an engine of either 102 HP or 180 HP. The fish hold capacity of these liners ranged between 12 and 23 tonnes. The fuel tank capacity was about 4 to 8 KL. The fresh capacity of the vessel was between 2-4 tonnes. OAL length of trawlers ranged between 13 to 17 m in Andhra Pradesh with the installed engine horsepower ranging between 90 HP to 250 HP.

Economic evaluation of fishing systems: The economic and financial performance of various fishing systems in East coast of India covering Vishakhapatnam coast were estimated using cost analysis. The sorra trawlers, sona boat (medium), large trawlers, mini trawlers, Mexican 4 net vessel, gillnetters and long liners were the fishing systems covered for the analysis. Labour costs were the major cost component among the expenses followed by capital costs and vessel costs. The running costs were the minor component of cost in the selected fishing systems.



Economic evaluation of fishing systems

Fish Processing

Institute Projects

- Interventions in processing and preservation of commercial and unconventional fishery resources
- Valorisation of marine and agro waste for development of green packaging materials
- SMART PACK: Development and characterization of smart packaging films for enhancing quality and shelf life of fishery products
- Development and validation of biomedical and cosmetic products from secondary fishery raw materials
- Development of soft computing systems in fisheries technology for technology dissemination and policy formulation.
- Process development and scaling up of production of different molecular weight chitosan with different degree of de-acetylation and evaluation of their applications
- Augmenting value and safety of wild and farmed fish of east coast through technological approaches
- Development of seaweed based edible and functional sachet for food packaging applications
- Assessment of fish harvest and post-harvest technological aspects and mitigation measures for problems with special reference to Maharashtra



Most Significant Achievements

- Bioactive peptide from yellowfin tuna red meat was used to formulate a malted grain-based health beverage suggesting the extensive scope of utilizing tuna cannery waste for upgraded products to meet consumer-specific nutritional demands.
- Green seaweed packaging film developed from Chaetomorpha sp. exhibited sealing properties at lower temperature
- Standardised a process for the co-synthesis of hydroxyapatite and nanocarbon dots from fish scale
- Designed and developed a facile web-based information system on the biochemical and nutritional composition of food fishes in India
- Developed a process for medium viscosity chitosan production from industrial chitin. The technology was transferred to two industries, viz., M/s. Meck Pharmaceuticals & Chemicals Pvt. Ltd. Gujarat and M/s. Chiranjeevi Processors, Coimbatore
- Dryfish and dryfish powder supplied to children of 3-6 years in 50 anganwaadis in tribal districts of Odisha indicated considerable improvement in their nutritional status.
- Endo-protease (0.25% w/v) enzyme treatment improved the peelability of the shrimp.
- tetA was found to be the most prevalent resistance genes (70.6%) among the tetacycline resistant isolates from the freshwater aquaculutre sytem.
- A. hydrophila that is potentially pathogenic to fish and humans showed different antibiotic susceptibility patterns at 28°C and 30°C compared to 37°C.
- Developed functional sachet from seaweed spp. and evaluated its functional and physicochemical properties.
- Whole genome sequences of three coliphages and one vibriophage were deposited in National Center for Biotechnology Information (NCBI) database.
- Formaldehyde detection in seafoods from the retail markets of Navi Mumbai region using ICAR-CIFT Rapid Formalin Test Kit indicated that one in five fish species were found to be unsafe for consumption due to presence of formaldehyde.
- Microplastics were not reported in 37.5% of the edible and gastrointestinal tissues of Meretrix meretrix (Asiatic hard clam) and Bombay duck (Harpadon nehereus) analysed and the particles identified were fiber shaped ranging from 227.37 - 5138 μm.
- Surimi based analogue products and RTE products from supermarkets of Navi Mumbai, were screened for seafood authentication and were found to be safe and unsubstituted.



CHIEF FINDINGS



Interventions in processing and preservation of commercial and unconventional fishery resources

Principal Investigator: Dr. George Ninan

Protein powder/hydrolysate from hard clam

Protein rich powder (46.63 %) was developed from the small sized crabs *Charybdis* spp. which can be used as a crab flavor ingredient in food formulations, thereby utilizing the unconventional resource often landed as bycatch in trawl operations.

Developed process protocol for the preparation of protein hydrolysate from Asiatic hard clam (*Meretrix meretrix*). Protein content of the hydrolysate varied from 81.57-83.33%. This provides a better utilisation scope for the clam spp.

Fish curry / Fish fingers



Retorted Oil Sardine and Yam Curry

The process parameters for a traditional Kerala style oil sardine and yam curry in retortable pouches was standardized.

Standardized protocols for the development of fish fingers from dressed white sardine (*Escualosa thoracata*). A good sensorial acceptance was recorded for the sample and a stability of seven days was observed for control samples (coated fish fingers) and ten days for coated and flash fried samples under chilled conditions (4°C).



Fish fingers from dressed white sardine



Valorisation of marine and agro waste for development of green packaging materials

Principal Investigator: Dr. Bindu J.

Edible films

Edible packaging film was prepared using green seaweed (*Chaetomorpha* sp.) and sodium alginate. Green seaweed packaging film developed from *Chaetomorpha* sp. could be easily sealed using hand operated sealing machine at lower temperature. Results showed green seaweed to be a sustainable, non toxic and ecofriendly material for preparing bioplastic for food application.

Developed a collagen based edible film from fish processing waste. Films were prepared with different concentrations (0.5% and 1% w/w) of collagen and glycerol was added as plasticiser.

Effect of type of solvent on the physical properties of poly lactic acid (PLA) films were assessed. For this, Poly lactic acid (PLA) films were developed by solvent casting technique using two different solvents namely, chloroform & dichloromethane. Thickness of neat PLA films prepared using chloroform and dichloromethane were $84\pm6 \mu m$ and $89\pm4 \mu m$. PLA films prepared using dichloromethane had better mechanical strength compared to films prepared in chloroform.

Cellulose packaging

Development and characterization of bacterial cellulose based packaging for fish processing applications were carried out. Bacterial cellulose (BC) production by *Komagataeibacter xylinum* in Hestrin-Schramm medium was standardized and further developed a BC film-based drip absorbent pad for fish packaging application.

Coir fiber composites were fabricated by layering coir fibers and applying bonding material of latex. The thickness of the composites was adjusted to the required size by placing them in a hydraulic press and applying a pressure and its thermal conductivity was evaluated.



Bacterial Cellulose Film

Edible coating

An edible coating formulation was standardized with sodium alginate as base ingredient and extract of prickly pear (*Opuntia* spp) fruit as an active ingredient. The formulation was used as dip treatment for enhancing the quality and shelf life of shark steak. Studies indicated an extended shelf life in coated fish samples under chilled storage conditions.


Assessment of Essential oil nano emulsions as bioactive edible coating for fish was carried out. Oregano (*Origanum vulgare*) and nutmeg (*Myristica fragrans*) essential oils were selected for oil-in-water nano-emulsion preparation.



Edible coating formulation with sodium alginate and prickly pear fruit extract

3

SMART PACK: Development and characterization of smart packaging films for enhancing quality and shelf life of fishery products

Principal Investigator: Dr. C. O. Mohan

Chitosan capped silver nanoparticles as temperature indicator

Chitosan capped silver nanoparticles as temperature indicator for room temperature stored products with limited shelf life. Combination of chitosan and $AgNO_3$ was standardized to get visible colour change from 24 and 48 h.



Various combinations of chitosan and AgNO₃ as time temperature indicator at chilled and room temperature





Paper based freshness indicator ^N

Paper based freshness indicator packed in HIPP trays and multilayered pouch was validated for its ability to indicate loss of freshness. Five fish species were used for the study. Except in tilapia, all the other samples changed colour from yellow to purple on the day of sensory rejection, indicating the efficiency of developed paper based freshness indicator.





Colour variations in paper based freshness indicators packed with samples

Development and validation of biomedical and cosmetic products from secondary fishery raw materials

Principal Investigator: Dr. Binsi P. K.

Chitosan hydroxyapatite membrane

Pure chitin was extracted from prawn shell through hydrothermal method at 180°C with acetic acid. FTIR profile indicated that the formed chitin was mostly free from other organics and exhibited almost all peaks related to chitin.

Guided tissue regeneration membranes were fabricated using chitosan, fish scale derived hydroxyapatite and Titanium dioxide.



Commercially available collagen membrane (heliguide)



Chitosan membrane loaded with fish derived hydroxyapatite and TiO, nanoparticles



Collagen peptide herbal tea

Developed collagen peptide incorporated herbal tea for cosmeceutical applications. Herbal tea infusion was formulated with dried hibiscus petals and collagen peptide in hot boiled water. The dried flower and collagen peptide concentration was standardized and pH and colour was maintained by the addition of citric acid. The herbal tea infusion was made in two different types like dip tea through tea bag and another by instant tea in powder form, which undergoes complete dissolution in both hot and cold water. The phytochemical screening of the tea infusion indicated the presence of secondary metabolites in spray dried powder similar to oven dried petals.



Collagen peptide-hibiscus tea infusion bag

Heparin from fish

Heparin was extracted from different parts of Tilapia fish for comparing the yield. Tilapia head, gut and skin were utilized for its extraction. The highest yield was obtained from fish gut followed by head and skin. The highest thrombin clotting time was obtained for heparin isolated from skin followed by head and gut.

Hydroxyapatite for water purification

Hydroxyapatite (HA) was used for removal of cations and anions from water. Hydroxyapatite alone showed highly efficient iron removal up to 99% in comparison to chitosan (CS) alone, HA and CS at different combinations. In case of Cd removal, combinations of HA and CS and CS alone was found more efficient (over 95%) than HA alone. HA alone at 0.5% level was found to be highly efficient in removal of lead from water.

Collagen hydrogels

Hydrogels were prepared using blends of collagen peptide with other biopolymers viz., bioactive extracts of aloe vera, papaya, cucumber, Vit C and hyaluronic acid and were characterized.



Nutrients from micro algae

Nutritional profiling of marine micro algae, Nannochloropsis oculate indicated its richness in protein, minerals, essential aminoacids, and essential fatty acids. The in vitro cytotoxicological studies indicated that this microalgae has no human toxic effect and can be used as an ingredient for nutraceutical development.



Freeze dried N. oculata

Development of soft computing systems in fisheries technology for technology dissemination and policy formulation

Principal Investigator: Dr. Joshy C. G.

Import of fish oil

Compositional analysis of import of fish oil (HS-1504) and fish meal (HS-230120) was carried out. India imported 551 tonnes of fish oil under the head HS-1504 in 2000 worth 1.21 million USD, which increased to 910 tonnes worth 14.07 million USD in 2019 with a mixture of up and down trend in import quantity; whereas the import value showed an exponential trend during this period.

Major countries exporting fish oil under the head HS-1504 to India were China, Chile, Norway, Iceland, United Kingdom (UK) and USA.

Fish meals/Pellets

India imports flours, meals and pellets of fish or of crustaceans, molluscs or other aquatic invertebrates under the subhead HS-230120 of HS-2301. The import of flours, meals and pellets under this head showed steep linear trend up to 2004, then started to decrease steeply up to 2008, a stagnated trend observed during the period 2008-2014 and then registered an increasing trend.

Major countries exporting flours, meals and pellets of fish or of crustaceans, molluscs or other aquatic invertebrates under the subhead HS-230120 to India were Chile, China, Norway, Oman, Peru, Thailand, UAE, Malaysia, Mauritania and Morocco.

Quantification of fish processing waste

Estimation of shrimp processing waste and it's management in organized shrimp processing sector in India indicated that the estimated shrimp processing waste ranged between 1.2 and 4.6 lakh tonnes from organized shrimp processing plants in India during the period of 2000-2018.

The survey on waste management in the organized shrimp processing sector revealed that 23% of shrimp processing plants sell shrimp processing waste as a secondary raw material to the industry for the development of value added by-products, whereas 64% of plants manage the shrimp processing waste



through contractors / agents and 11% use other options like dumping or burying to discard the waste. The results also revealed that 41% of plants see a demand for shrimp processing waste as a secondary raw material, whereas 59% of plants see no demand for shrimp processing waste as a secondary raw material.

Estimation using statistical models

Statistical models for estimating trend and growth of shrimp culture and production in India was developed. Linear and non-linear parametric regression models were fitted to the secondary data on area under culture and production of different species of shrimp viz: Tiger shrimp (*Penaeus mondon*), white leg shrimp (*Litopenaeus vannamei*) and scampi (*Macrobrachium rosenbergii*) to estimate the growth rate of cultured shrimp production in India. Logistic model was found to be best fitted model for total AUC and shrimp production. Gompertz model was best fitted model for both AUC and production data of white leg shrimp. Cubic model was best fitted model for AUC and production of tiger shrimp and scampi.

Process development and scaling up of production of different molecular weight chitosan with different degree of de-acetylation and evaluation of their applications

Principal Investigator: Dr. Elavarasan K.

All the industrial chitins were found not suitable for producing medium and high molecular weight chitosan. Chitosan with medium and high molecular weight could be produced by both cold and thermal processing techniques developed by ICAR-CIFT using industrially produced chitin adopting certain set of process conditions.

Medium viscosity chitosan production cost was in the range of Rs. 450/- to 550/-. Usage of water was still a problem to be addressed for sustaining the chitosan industries. In India, industrialists were expressed their demand to opt for medium viscosity and high viscosity chitosan production. However, many of the existing producers were unable to produce the same.

ICAR-CIFT technology can be easily scaled up for industrial production and the technologies developed was already transferred to two existing industries.

Augmenting value and safety of wild and farmed fish of East Coast through technological approaches

Principal Investigator: Dr. B. Madhusudana Rao

Physicochemical quality of dried fishes from local markets of Visakhapatnam

Different dried fish samples from local markets and hyper market of Visakhapatnam district were analysed for its quality attributes such as moisture, water activity, salt content and acid insoluble ash. Dried fishes collected from hyper market were of good quality and were within the quality requirement established by FSSAI.





Low salt dried tuna chips

Dried and boneless tuna chips were prepared from little tuna, *Euthynnus* sp. Boneless fillet loins from tuna had 74.1% moisture and 1.18% salt content. The loins were brined with different brine/sugar combinations, which lead to drop in moisture and salt uptake. Addition of sugar helps to reduce the salt content in the dried product. The acceptability varied with the salt/ sugar content and other conditions of experiment.

Microbial quality of low salt dried fish



Decapterus fish were brine salted with different combinations of salt–sugar mixture and dried to a moisture content of 30%. Initial microbiology parameters were found similar in all samples. However, at the end of seven months storage higher TPC was noticed in fishes salt dried with 15% salt and 5-10% sugar. Fishes salted with 20% salt and 5% sugar had similar counts to that of control samples (salt dried with 20% salt alone). Yeast and mould counts were more in samples having higher sugar. So, addition of sugar at lower concentration during brining can reduce the salt content but impart similar water activity and microbial quality compared to salt brining.

Enzyme assisted peeling of white leg shrimp (Litopenaeus vannamei)

Headless white leg shrimp (20.3 \pm 4.79g) were treated with proteolytic enzyme namely endo-protease and exo-protease to felicitate the shell loosing prior to peeling. Headless shrimp were treated with endoprotease, exo-protease and different combinations of endo/ exo-protease. Proteolytic enzyme treatment effectively improved the peelability of the shrimp and a combination of endo and exo protease could be used for the purpose.

Prevalence of tetracycline resistance genes (*tet*) in tetracycline resistant bacteria

Of the 14 tetracycline resistant genes tested, *tetA* (70.6%) was found to be the most prevalent resistance genes among the tetacycline resistant isolates from the freshwater aquaculture system. Other tet genes that were prevalent in the freshwater aquaculture system included *tetL* (41%), *tetS* (29%), *tetK* (8.8%) and *tetM* (8.8%). However, other tet genes namely *tetB*, *tetC*, *tetD*, *tetE*, *tetG*, *tetO*, *tetP*, *tetQ* and *tetX* were not detected in the tetracycline resistant isolates.



Waterless transport of live shrimp

The survival rate of live *L. vannamei* shrimp transported in waterless condition (six hours) was 83-87%. An initial pre-conditioning was given prior to waterless live transportation, from ambient temperature to 10-12°C, over a period of about two hours resulting in pseudo hibernation of shrimp. During transportation, the system was maintained at low temperature and high relative humidity.

Tetracycline resistance potential of heterotrophic bacteria isolated from freshwater fish farms

A total of 319 tetracycline resistant isolates from different ecosystem and fish feed were recovered from trypticase soyagar (TSA) supplemented with 16µg/ml of tetracycline hydrochloride. All the isolates showed resistance to different concentrations of tetracycline. Similarly, about 14% of the isolates showed resistance to high concentration of tetracycline indicating the very high resistance potential of heterotrophic bacteria to the broad-spectrum antibiotic, tetracycline.

Cross resistance of tetracycline resistant bacteria to other antibiotics

Sensitivity of the strains to other antibiotics indicated sensitivity to enrofloxacin, cefotaxime, Cotrimoxazole, furazolidone following Kirby-bauer disk diffusion method.



Cross resistance of tetracycline resistant bacteria

In vitro response of *Aeromonas hydrophila* isolated from farmed freshwater fish to antimicrobials at different temperatures

The antimicrobial susceptibility of *A. hydrophila* (from different fishes) to 19 different antibiotics at four different incubation temperatures viz., 26°C, 28°C, 30°C and 37°C were analysed. The results indicated that *A. hydrophila* that is potentially pathogenic to fish and humans showed different antibiotic susceptibility patterns at lower temperatures of 28°C and 30°C compared to 37°C.



Mechanical properties of seaweed-based sachet

T2

0.273

Assessment of fish harvest and post-harvest technological aspects and mitigation measures for problems with special reference to Maharashtra

0.307

T Ulva-1

Tear Resistance (N/mm)

0.275

T Ulva-2

Principal Investigator: Dr. L. Narasimha Murthy

0.316

T1

Tearing Strength (N)

0.5

0

Evaluation of industrial effluent water from cephalopod and crustacean processing unit

Industrial effluent from inlet and outlet of cephalopod and crustacean processing unit were analyzed for various physicochemical parameters. The pH, total hardness, chloride values, permanent harness, COD, TPC and coliforms were determined. The total plate count of inlet and outlet waters for cephalopod processing unit were 4.08x10² and 2.48x10² respectively. Coliform counts for inlet and outlet were above acceptable limit.



Detection of formaldehyde in fish and shellfish species marketed in Mumbai

Formaldehyde detection from seafood marketed in retail markets of Navi Mumbai region have been carried out for 25 different species of fish and shellfish using 'Rapid Formalin Test Kit (K137-1KT) developed by ICAR-CIFT, TCA Extraction and Nash reagent method. Five species out of 25 viz. Bombay duck/ Bombil, Gangetic mystus/ tengra, Fringe scale sardine/ Lesser sardine/ Pedvi, Pink perch/ Rani masa and Golden anchovy/ Mandeli were found to be unsafe for consumption using 'Rapid Formalin Test Kit' due to presence of formaldehyde. Whereas, 'TCA Extraction and Nash reagent method' revealed that only one fish, indicating the sensitivity of the kit used.



Quality and shelf-life evaluation of cuttle fish treated

with commercial additive used in seafood industry

Effect of commercially used additives on the quality and shelf life of cuttle fish under chilled storage was assessed and it was compared with tri sodium phosphate (2.5% & 5%) treated one. Results indicated that cuttle fish treated with tri sodium phosphate had a shelf life up to 14 days than control and commercial additives treated samples (11days).



Effect of salting and drying on the biochemical quality of fish

Fresh Indian anchovy (*Stolephorus indicus*) were salt treated (5% salt for 5 min) and subjected to microwave drying (1200 MHz for 90min.) and electrical dying at 50°C for 16hrs. TBA values were found be higher in microwave dried sample (0.88mg MDA/kg) than sample dried under electrical dryer (0.34mg MDA/kg). There was no significant difference in TVB-N content.

Effect of antioxidant/antimicrobial coating on the quality of dried fish and shrimp

Indian anchovy (*Stolephorus indicus*), golden anchovy (*Coilia dussumieri*) and shrimp (*Aristus* sp.) were subjected to 5% salt treatment for 5 min and dried at 55°C for 10-12hrs. Biochemical, microbiological and sensory qualities were analyzed for upto four month. Peroxide values were within acceptable limit throughout the storage. TVB-N content ranged between 25.20mg% -145mg% and TMA-N content varied from 2.8mg% to 42.50mg%. Microbiological analysis revealed that all samples had a total plate count within acceptable limit up to 3rd month.

Effect of citric acid, tri-sodium phosphate treatment and drying on the quality of fish and shellfish

Fresh fish (Indian anchovy (*Stolephorus indicus*), Golden anchovy (*Coilia dussumieri*) and Shrimp (*Aristus* sp.) were subjected to 5% salt treatment for 5 min and subjected to citric acid, trisodium phosphate dip treatment, respectively and dried at 55°C for 10-12hrs. Biochemical, microbiological and sensory qualities were analyzed up to three months. Microbiological analysis revealed that all sample had a total plate count within acceptable limit up to 2nd month.

Presence of microplastics in edible and gastrointestinal tissues of Asiatic hard clam and Bombay duck

Nine samples of Asiatic hard clam (*Meretrix meretrix*) and sixteen samples of Bombay duck (*Harpadon nehereus*) were collected from domestic market of Navi Mumbai in fresh condition. The edible and gastrointestinal tissues were separated and analysed using inverted microscope. In 37.5% of the sample's no microplastic was not detected. In Asiatic hard clam, 31 pieces microplastics particles were noticed with 19 pieces from gastrointestinal tissues and 12 from edible tissue. The number of microplastics observed in Bombay duck samples were twelve, with seven pieces from gastrointestinal tissues and five from edible tissue. All particles identified were fiber shaped ranging from 227.37 - 5138 µm.

Heavy metal content in Bombay duck collected from retail market

Fresh Bombay duck (n=34) were purchased from local market and evaluated for its heavy metal content. Arsenic content was detected in 5.9% of samples in the range of 0.56 to 1.2 ppm. Cadmium content was present in 94.1% of samples in the range of 0.07 to 0.21 ppm. Lead content was detected in 5.9% of samples (Avg. 0.36 ppm) and mercury content was detected in one sample (2.9%) with average value of 0.19 ppm. The analysis showed the concern on food safety on the samples being sold in the retail market.



Gold nano particle-based detection of histamine content

Gold nano particles were prepared by citrate reduction method. The particles showed a maximum UV-Vis absorption at 520 nm. Visible colour gradation was observed during reaction between gold nano particle solution and histamine standards. Colour change from vine red to purple was observed.



Gold nano particle-based detection of histamine content

Screening of surimi based analogue products and RTE products for seafood authentication

A total of six fish and fisheries product were collected from supermarket of Navi Mumbai, Vashi. DNA extraction done by DNASure Micro KIT and source data including date, location, type of fish product and common name of the species were recorded. The fish and shellfish product mitochondrial gene were amplified. Positive reactions were purified with Quick Gel Purification Kit and sequenced. The sequences were both double compared with GenBank (http://www.ncbi. nlm.nih.gov/genbank/) and the BOLD (www.boldsystems.org) databases employing Blastn Search Tool and BOLD identification tools, respectively. In all cases, BOLD was the criteria for the adopted species identification, only those with a similarity index greater than or equal to 98% in both databases were considered valid.

Sold as	Identified as
Fish fingers	Oreochromis niloticus (Tilapia fish)
Crab sticks	Nemipterus japonicus (Threadfin bream)



M(100bp) Fish fingers Crab sticks

Fish product and common name & scientific name of the species

Identification of the major problems with the fishing gears and mitigation measures

The major problems in fishing during the year 2021 were associated with COVID 19 pandemic. Availability of labor was one of the problems. With the increase in price of diesel, boat owners found it unaffordable to manage cost of fishing and fishing trips were decrease. Net menders were also facing job issues due to low fishing activities. The major problems faced during dol net fishing was dolphin bites and catch loss which was very common.

Quality Assurance and Management

Institute Projects

- Enhancing utilization of rest raw materials of aquatic origin for Feed, Agricultural and Industrial product development.
- Ensuring safety of fish and fishery products: Framework for validating Regulatory specifications.
- Safety and quality aspects of fish and fishery product from Gujarat coast

Most Significant Achievements

- Natural levels of formaldehyde in 152 species of finfish and shellfish comprising of 2929 samples collected from 28 locations across India was estimated.
- Residues in samples submitted by participating centres of the project.
- Method developed for total Florfenicol residues in fish as sum of Florfenicol and its amine, oxolinic acid, enrofloxacin, ciprofloxacin, Sulfadimethoxine by AB Sciex 4000 QTRAP Mass Spectrometry. Analysis of tissue depletion and withdrawal period estimation of Florfenicol in feed administration to marine and freshwater fishes was done.
- Heavy metal and trace mineral data of 3616 samples of 240 species of commercially important finfish and shellfish varieties were compiled and submitted to FSSAI for formulation of standards.
- Developed method for the determination of multiclass pesticide residue in Fish and Fish products.
- Ingredient compositions and machine operation parameters were standardized for floating feed preparations by utilizing fish waste.
- Studies indicated that 38% of ice used for seafood preservation harboured one or more Shiga toxin genes
- The isolates of L. monocytogenes were found to possess all virulent genes namely inIA, inIC, inIJ, hIyA, iap, pIcA and prfA, respectively.
- Serotyping of L. monocytogenes isolates indicated that they belong to serotype 1/2a, 3a serogroups



CHIEF FINDINGS

Enhancing utilization of rest raw materials of aquatic origin for feed, agricultural and industrial product development

Principal Investigator: Dr. Zynudheen A. A.

Standardised the preparation of floating feed from fish processing discards. Ingredient composition and speed of machine operation was optimised. It was observed that maximum of 35% slurry could be added to give the required moisture of 38%.

Formulation of foliar nutrient

Formulation of foliar nutrient with potent additives to modify its properties and performance, orienting its application in microgreen was attempted with additional ingredients, moringa leaf powder, banana peel powder and onion peel powder with anchovy head waste peptides. The ingredients were subjected to nutrient analysis viz., proximate and mineral composition for deriving the effective combinations for further application in microgreens.

The fermented foliar spray prepared from tilapia waste was analyzed for elemental profile, NPK (Nitrogen, Phosphorus & Potassium) content, protein and lipid content. The NPK content ranged from 14000-16800 ppm, 2298-2527 ppm and 880-936 ppm, respectively. The protein content ranged from 7.0-9.0% and the lipid content ranged from 3.0-5.0%, respectively.

Mineral profiling of foliar spray developed from microbial silage with 10-30% carbohydrate and with 3% anti-fungal. Calcium (~4600-5100 ppm) was detected at highest level in all the three samples followed by phosphorus (~2200-2500 ppm) and sodium (~1700-1800 ppm). Potassium (~800-900 ppm), magnesium (~500 ppm) and zinc (~10-170 ppm) were detected at medium level. Iron (~30 ppm), aluminum (~1-50 ppm), manganese (~4 ppm) and strontium (~25 ppm) were detected at low level. Other elements were detected at trace level.

Peptone hydrolysate from cuttlefish waste^N

Peptone hydrolysate of cuttlefish waste showed a protein of 82 to 84 %, fat of 6.3% and 2% ash. Cuttlefish hydrolysate protein was compared with control fish protein hydrolysate, solvent extracted fish protein hydrolysate, and trypticase soy broth with *Staphyococcus aureus*. Studies revealed good growth in both FP (Control) and FP (Solvent) in comparison to the Standard Media (TSB). Slight increase in the colour of the media was observed when FP was used. Elemental analysis showed a high content of Na, K, Ca, P, Fe and Mg as well as other micro elements in good levels.



Enhancement of antimicrobial activity of Chitosan Oligo-Saccharide (COS) by addition of Cupric Oxide Nanoparticles (CuO-NP) has been attempted. A composite comprising of 1 % and 2% CuO-NP was incorporated into 20% COS and checked for antibacterial activity. The zone of clearance was higher in



the gram-negative bacteria compared to gram-positive bacteria. The zone of clearance for the composite was subtle higher compared to its COS

The antibacterial activity of COS was enhanced by the Copper Oxide Nanoparticle (CuO-NP). The results demonstrated higher inhibition for COS-CuO-NP composite.

2

Ensuring safety of fish and fishery products: framework for validating regulatory specifications

Principal Investigator: Dr. Satyen Kumar Panda

Risk assessment for the intake of chemical contaminants through fish caught in the Cochin estuary region

A total of 108 samples of fish were analyzed for more than 300 chemical contaminants including pesticides, organochlorines, polyaromatic hydrocarbons, and polychlorinated biphenyls. Risk assessment based on "Hazard Index" was estimated for the detected pesticides. A hazard index close to 1.0 was observed for Metalaxyl and 2-phenyl phenol, which indicated moderate risk to the coastal population.

Compliance of commercial brands of fish oil capsules to codex requirements

The commercial brands of fish oil capsules (imported and domestically manufactured) available in India were tested for compliance with quality and safety parameters enshrined in Codex STAN 329-2017. A sum total of 17 commercial brands were evaluated for acid value, peroxide value, anisidine value, ToTox value, Vitamin A &D and antioxidants. Peroxide values ranged from 0.917 to 9.730 milliequivalent of active oxygen/kg oil. In 31.2% of the samples the peroxide value breached the Codex limit of \leq 5 milliequivalent of active oxygen/kg oil. Acid value ranged from 0.16-4.99 mg KOH/g. In 6.25% of the samples the acid value crossed the prescribed Codex limit of \leq 3 mg KOH/g.

Risk assessment: Characterization of Staphylococcal enterotoxins and Shiga toxins

A total of 50 dry fish samples from Gujarat region were tested and 6 coagulase positive Staphylococcal isolates were found to produce staphylococcal enterotoxins (*SEA, SEB, SEC, SED* and *SEF*). About 12 isolates of *E. coli* isolated from dry fish were tested for the presence of Shiga toxigenic *E. coli* (STEC) *stx1* and *stx2* genes and virulence genes (*eae A* and *hlyA*) of which two isolates from reef cod showed the presence of stx1, and 4 isolates from anchovy and Crocker had stx2, and one isolate from Crocker had hlyA genes, respectively.

Effect of simulated digestion on antigenicity of raw and cooked kiddi shrimp extract

In vitro digestion of *Parapenaeopsis stylifera* using simulated gastric fluid and intestinal fluid showed the release of allergenic Tropomyosin in both raw and cooked samples.



Compliance to food safety and standard regulations for dried/salted fish products

Among the Dried/ Salted & Dried Fish Products of Gujarat and Diu region absolute compliance to FSSR requirements was observed for dried Bombay duck, whereas in dried shrimp, reef cod and shark samples, the yeast and mold count, APC, Escherichia coli and acid insoluble ash contents were more than the stipulated limits. In samples collected in this category from Maharashtra region, violation of FSSR limit was observed for acid insoluble ash and yeast and mold count in salted and dried Indian mackerel. Histamine content exceeded FSSR limit of 200 mg/kg in dried anchovy and seer fish samples (311- 3877 mg/kg). In terms of compliance to heavy metal limits, cadmium content was 0.12 to 5.5 mg/kg. High Cd level was detected in dried cuttle fish samples in whole form. Presence of lead was detected in 1.4% of samples in the range of 0.22 to 5.5 mg/kg. High lead content was observed in dried ribbon fish samples in whole form. Presence of mercury was not detected in any of the samples.

Screening of allergic proteins in Coastal mud shrimp and Asiatic hard clam

Inter-laboratory validation of analytical method

Samples of Coastal mud shrimp (*Solenocera crassicornis*) and Asiatic hard clam (*Meretrix meretrix*) were tested for identification of allergic proteins. One dimensional immunoblotting of raw extract identified allergic proteins having molecular weight of 38 and 20 kDa in Coastal mud shrimp and 38, 75, 20 and 15 kDa in Asiatic hard clam. For cooked Asiatic hard clam extract, protein band of 37 kDa was identified.



Inter-laboratory validation of analytical method for multi-residue analysis of 250 contaminants including pesticides by GC-MS/MS and LC-MS/MS was carried out, where a Horwitz ratio for 69 compounds were observed below 2.0, indicating reproducibility of the developed method and adoption as official method by FSSAI.

Validation of analytical method for multiresidue analysis of antibiotics as per FSSR

A multiresidue method was developed for the analysis of 12 veterinary drugs (Tetracycline, Oxytetracycline, Chlortetracycline, Sulfanilamide, Sulfadiazine, Flumequine, Albendazole, Albendazole-2-aminosulfone, Albendazole sulfoxide, Albendazole sulfone, Ampicillin, and Cloxacillin.) in fish as per FSSR listed tolerance limit and validated with 11 laboratories.

Quality Assurance and Management

A N N U A L REPORT 2021

Inter-laboratory validation of histamine determination in fish and fish products as per ISO 19343:2017

An inter-laboratory study was conducted for determination of histamine in fish muscle across 22 laboratories using performance criteria given in ISO 13528:2015. The quantification of histamine was carried out as per procedure described in ISO 19343:2017. The samples were tested for homogeneity by comparing sample variability with predicted reproducibility standard deviation obtained by modified Horwitz model. The sample matrix was found to be sufficiently homogenous. Stability test of the sample depicted the sample matrix to be stable for entire duration of the inter-laboratory study. The histamine levels in the sample matrix, as quantified by different laboratories varied from 35.46 to 52.69 mg/kg with standard deviation of 4.67 mg/kg. The performance criteria of the laboratories were assessed by z score and results were found to be acceptable (-3 > z >+3). The HorRat ratio for the study was found to be 1.13. Further the data set followed a fairly normal distribution (skewness: -0.43), as revealed by kernel density plot

Validation of rapid food testing kits $^{ m N}$

VIDAS LMX Kit for *Listeria monocytogenes*, VIDAS SPT Kit for Salmonella, TEMPO APC, TEMPO *Escherichia coli*, TEMPO *Staphylococcus aureus*, Gene-Up Salmonella, Gene-UP *Listeria monocytogenes* kits were validated as per ISO 16140-3: 2021 protocol. For qualitative test kits eLOD50 was determined and for quantitative test kits SIR and eBias was determined. Acceptance criterion matched for both Implementation verification & Food Item verification as per ISO 16140-3.

Determination of Amnesic shellfish poisoning

Method was developed for determination of Domoic acid (active component of Amnesic shellfish poisoning) as per AOAC 991.26. The detection was carried out at 242 nm with isocratic elution using mobile phase consisting of acetonitrile –water acidified to pH of 2.5. Finfish and shellfish samples (27 numbers) comprising of Ray, *Caranx* sp., Rainbow runner, *Aprion* sp. (job fish), Sail fish, Rabbit fish, Babylonia, Clam, Crab, *Sepia* sp. and *Octopus vulgaris* were tested for presence of domoic acid. In none of the samples, domoic acid could be detected above LoQ levels

3

Safety and quality aspects of fish and fishery product from Gujarat coast

Principal Investigator: Dr. Ashish Kumar Jha

Nutrient composition of sharks landed along Saurashtra coast

Proximate composition and mineral content of six commercially available shark species along the Saurashtra coast were estimated. The crude protein content in the muscles ranged between 63.1% to 73.42% on dry weight whereas the protein content in the liver were between 12.5% to 24.4% on dry weight basis. The crude fat in the muscles ranged from 0.3% to 1.72% and in liver ranged from 51.27 to 73.60%. The ash content in muscles varied from 3.87 to 5.48% whereas in liver it was observed between 0.49% to 1.99%.



Antibiotic residues in farmed shrimps from Gujarat

About 13 samples (8 shrimp and 5 aqua feed) were analysed by LCMS/MS method for the development and standardization of chloramphenicol. All the analysed samples were observed to have the antibiotics below detection level.

Metal pollution Index and health risk assessment of heavy metals in sharks landed at Veraval

Trace minerals and heavy metals were estimated in the commonly landed shark in Veraval and used for calculation of metal pollution index (MPI) as well as human health risk assessment. The study on metal pollution index shows that the MPI of *Carcharhinus amblyrhynchoides*, *Carcharhinus sorrah*, *Carcharinus falciformes*, *Glaucostegus granulatus*, *Chiloscyllium arabicum*, *Carcharhinus sorrah* were 1.44, 1.19,1.60, 0.61, 0.56, 0.79, respectively.

Isolation and characterization of Shiga toxin-producing *E. coli* from ice used for seafood preservation in Veraval

A total of 160 *E. coli* isolates were isolated from 100 ice samples (20 each from 5 different collection sites) using culture-based methods. One or more Shiga toxins genes were detected in 33 isolates. Of 100 samples analyzed, 38% samples harbored STEC. Out of 160 isolates, 31(19.37%) and 60 (37.5%) of isolates had stx1 and stx2 genes.

Prevalence, characterization and antimicrobial resistance of *L. monocytogenes* isolated from fishery environment

The prevalence of *Listeria monocytogenes* in the ice used for fish preservation and fish in the fish hold was investigated. Around 120 samples including ice and fish were collected from different nodal points. The incidence of *Listeria* spp. and *Listeria monocytogenes* was 3.3% and 2.5%, respectively. The *L. monocytogenes* isolates were tested for antimicrobial susceptibility test and found that the isolates were multidrug-resistant and showed resistance to penicillin, tetracycline, cefotaxime and Cephalothin.



Multiplex PCR profile for serotyping of L. monocytogenes from fish



Microbiology, Fermentation and Biotechnology

Institute Projects

- Biotechnological approaches for utilisation of aquatic microbial resources and their products
- Virulence and antibiotic resistance profiling of seafood borne pathogens and development of control measures

Significant Achievements

- Salmonella Paratyphi B from seafood was typed by MLST
- Silver nanoparticles were synthesized through green technology by using citrus limon
- AgNPs were able to inhibit the growth of V. mimicus at very low concentrations
- Fenton's reagent was found to be effective for the inactivation of heterotrophic bacteria and tetracycline resistant bacteria
- Transconjugants of E. coli obtained by coculturing of E. coli with multi-drug resistant bacteria acquired resistance to ciprofloxacin, chloramphenicol, co-trimoxazole, erythromycin and oxytetracycline.
- 42.1% of the S. Typhimurium from seafood were found to be multidrug resistant
- Vibrio mimicus was present in 6.3% of seafood samples and were strong biofilm producers
- Incidence of Klebsiella pneumoniae in fish and fishery environment was 4.1%
- Genes coding for tetracycline, sulphonamide, chloramphenicol, quinolones and integrons 1 and 2 were present in Arcobacter sp isolated from seafood. Virulence genes (ciaB, mviN, cadF, pldA and cj1349) were detected in Arcobacter sp.



- E. coli, Staphylococcus sp., and Vibrio sp., were present in 88.5%, 100% and 48.5%, respectively in the aquaculture farms
- Antibiotic-resistant Enterobacteriaceae carried ARGs on its plasmid mainly in IncFIA & IncFIB in ESBL E. coli and IncHI1 in K. pneumonia of shrimp aquaculture farms in Kerala.
- Developed DPA kit for the detection of antibiotic residues from shrimp, fish feed and water for ampicillin, amoxicillin, carpenicillin, cephalothin, cefoxitin, cefazolin and cloxacillin from 4-30ppb MRLs and LODs of 1-100ppb and is under field evaluation with Shrimp farmers, fish processing industry and MPEDA, Cochin.
- Most prevalent resistance profile of MRSA was ampicillin-cefazolin-cefoxitin-gentamicin-norfloxacinoxacillin-penicillin with agr III type and carry SCCmec-IV elements harbour PVL toxin genes and ST88 with spa type t2526 from the market fish samples.
- First report on the incidence of ST88-SCCmec-IV (ST88-IV) MRSA in the fish market in Assam.
- Ten novel ST's of K. pneumonia and one of K. quasipneumoniae were identified from retail fish market
- EHP was detected in shrimp farms and EUS in Tilapia farms from Kerala region.

CHIEF FINDINGS



Principal Investigator: Dr. Toms C. Joseph

Bacterial bioprocessing of shrimp shell waste for the production of chitin

Process parameters for the microbial production of chitin from shrimp shell waste was optimized using protease producing *Bacillus* strains belonging to *B. circulans, B. pumilis* and *B. megaterium* isolated from shrimp farms and aquatic environments. The final chitin content of the bioprocessed shrimp shell waste ranged from 21.18 ± 1.03 to $26.55 \pm 0.21\%$ while the ash content ranged from 48.03 ± 1.14 to $52.79 \pm 2.01\%$. The crude protein content of the samples ranged from 8.69 ± 0.88 to $12.53 \pm 1.90\%$.

Multi locus sequence typing (MLST) of Salmonella serotypes from seafood

Multi Locus Sequence typing of the Salmonella Paratyphi B isolates from seafood markets of Cochin identified two sequence types, ST 1510 and ST 3765.

Microbiology, Fermentation and Biotechnology



Synthesis of carbon dot based fluorescent probe for microbial application

Antibacterial activity of carbon dot obtained from fish scale against *Escherichia coli, Bacillus subtilis, Satphylococcus aureus, Methicillin resistant S. aureus* showed the complete bactericidal potency at 100µg/ml carbon dot for all pathogens after 24hr exposure.



Graph showing the bactericidal activity of carbon dot against different pathogens

Bioimaging potential of carbon dot for bacterial cell labeling

Bacterial attachment to carbon dot was studied using well scan mode in microplate reader by scanning the fluorescent intensity at 485/20nm excitation filter and 590/35 nm emission filter. The fluorescent signals of the bacterial cells were noted when treated with carbon dot even after repeated washing with 1X PBS.

Mitigation of antibiotic resistant bacteria and its genes from aquaculture farm effluent water

Inactivation of total heterotrophic and tetracycline resistant bacteria from shrimp pond rearing water samples were investigated using three disinfectants viz., chlorination, Fenton's reagent and hydrogen peroxide. The study revealed that total heterotrophic bacterial count and tetracycline resistant bacteria were reduced by Fenton's reagent (2 mM Fe₂+ + 20 mM H₂O₂) by 2.65 Log and 1.66 Log, respectively.

Minimum inhibitory concentration (MIC) test of *E. coli* transconjugants cocultured with multi-drug resistant bacterial isolates were found in the range of 0 to 0.5 μ g mL⁻¹ for ciprofloxacin, 32 to 128 μ g mL⁻¹ for chloramphenicol, 64 to 512 μ g mL⁻¹ for co-trimoxazole, 32 to 128 μ g mL⁻¹ for erythromycin and 32 to 512 μ g mL⁻¹ for oxytetracycline indicating acquisition of resistance.

16S rRNA gene sequences of 53 multi-drug resistance bacteria from shrimp culture environment was submitted in the public domain (NCBI). Dominant antibiotic resistant isolates belonged to 35 bacterial species under 15 genera.



Synthesis and optimization of nanoparticles using green technology

Silver nanoparticles was synthesized using green technology with lemon peel extract (*Citrus limon*) exhibited antibacterial properties against *V. mimicus* at very low concentrations

Microbial Composting of fish waste including domestic waste

Microbial composting of food waste with the inclusion of 5% fishery waste converted to compost in 80 days and 10% fishery waste converted to compost in 60 days. Microbial cultures were identified as *Bacillus subtilis* and *Bacillus licheniformes*. Carbon to nitrogen ratio of the compost ranging from 5:1-8:1 was found to be ideal.



Microbial composting organic waste including fishery waste

Microbial consortia for remediation of waste from shrimp culture ponds

The survey results of sludge pits/shrimp toilets found that *L. vannamei* shrimp ponds managed with sludge removal units had a culture area of 25 acres to 200 acres with an average size of 1.5-2 acres of individual pond. An allocation of about 5-7% of the total area of pond for the construction of sludge pits in the center of the pond can be adopted as an effective pond health management strategy.



Showing the Clear plaque of Pseudomonas phage after double layer agar plating

Microbiology, Fermentation and Biotechnology



Antibiofilm activity of Violacein pigment from *Chromobacterium violaceum*

A method was developed for isolation of C. *violaceum* using mineral modified glutamate medium (MMGM) along with Tryptone Bile Glucuronic Agar, since there is no specific media for the isolation of the same.

Minimum biofilm inhibitory concentration (MIC) and minimum bactericidal eradication concentration (MBEC) of violacein pigment was found in the range between 37-45 µg/mL for moderate, high and very high biofilm-producing strains of *E. coli*.

Virulence and antibiotic resistance profiling of seafood borne pathogens and development of control measures

Principal Investigator: Dr. Visnuvinayagam Sivam

Genetic characterization and AMR profiling of important seafood borne pathogens

Carbapenemase and ESBL producing *E. coli* and *K. pneumoniae* were isolated from seafood. Prevalence of *Vibrio vulnificus* was 6.6% in seafood and aquaculture samples. Two percent of the retail market samples of Visakhapatnam harboured *Klebsiella pneumoniae*.



Uniplex PCR product of khe gene (428 bp) separated on 1.5% agarose gel. Lane L: 100 bp Marker, Lane 1-8: test isolates; Lane 9: ATCC 700603; Lane NC: negative control

Six percent of seafood samples harboured *V. mimicus*. All the isolates carried protease and DNase and were biofilm producers.



Biofilm assay of V. mimicus isolates by microtitre plate method



Method was developed for the detection of *V. mimicus* and *V. alginolyticus* in seafood samples by primary enrichment in APW followed by second enrichment in salt media (T_1N_0, T_1N_0) and polymerase chain reaction. A Real-time PCR assay was optimized for the confirmation of *V. alginolyticus* by targeting the *dnaJ* gene.

Virulence characterization and AMR pattern of pathogens

Salmonella isolates from seafood were resistant to gentamicin (78.26%), ciprofloxacin (35%) and azithromycin (77.8%). A total of 60.52 % of the *S. Typhimurium* and 24.24% of the un-typable *Salmonella* isolates exhibited resistance to at least one of the antibiotics tested and 42.1% of the *S. Typhimurium* were found to be multidrug resistant (MDR). *S. Paratyphi* B isolated from seafood were confirmed as *S. Paratyphi* B biovar java.

ESB producing *E. coli* isolates (n=50) from seafood and aquatic environments harboured antibiotic resistance genes (ARGs) and disinfectant resistance gene (DRGs) elements and showed resistance to cephalosporins (cefotaxime), ampicillin, tetracycline, and sulfonamides.

Beta-lactamase gene of *E. coli* isolated from Vembanad Lake belonged to *bla*TEM-1, *bla*TEM-116, *bla*CTX-M-27, *bla*CTX-M -55, *bla*CTX-M -152, *bla*CTX-M-205 and *bla*SHV-27.

Multi Locus Sequence Typing analysis of the selected ESBL *E. coli* identified ST11439 and new STs as a single or double locus variant of existing STs. Plasmid Based Replicon Typing revealed that Vembanad Lake *E. coli* carried Inc Plasmids *viz.*, B/O, F, W, I1, FIIA, HI1, P-1α, K/B, and N.

Double disk diffusion assay conducted on 76 presumptive ESBL *E. coli* confirmed that 55% of them were ESBL *E. coli*. *bla*TEM, *bla*CTX-M1 and *bla*CTX-M9 were detected in *E. coli* isolated from the second surveillance program to Vembanad Lake, Kerala, India.

Isolates of Arcobacter species were screened for various AMR genes and *TetA* gene, *sul1*, *sul2*, *catl*, *qnrD*, *int1* and *int2* were detected with *TetA* as the major gene followed by *sul1gene*. Antibiotic resistance genes such as *tetA*, *tetM*, *sul1*, *sul2*, *catl*, *qnrA*, *qnrD*, *ermB*, *ermC* and integrons *int1* and *int2* and virulence genes; *ciaB*, *mvi*N, *cadF*, *pldA* and *cj1349* were prevalent in isolates of *Arcobacter* sp. isolated from seafood.

SyBr green based Real time PCR method targeting *tet*A gene was standardized for the detection of tetracycline resistant gene in drug-resistant Acrobacter.



Amplification of virulence determinants in Arcobacter sp. a) ciaB gene-284 bp and b) mviN-294 bp

Microbiology, Fermentation and Biotechnology



The subsystem super class distribution in the MRSA strain

Draft genome sequence of a MRSA ST 28/ t021 is a CC30, community Associated-MRSA (CA- MRSA) (lukS-lukF+) isolated from ribbon fish (*Trichiurus lepturus*) in Veraval, Gujarat was determined. The strain was multi-drug resistant harboring staphylococcal endotoxins, haemolysins, ureolysin, serine protease, and more than 7 antimicrobial resistance genes. The total genome was 2.8Mb with 2797 predicted genes.



Assessment of Antimicrobial Resistance of *E. coli* in Sasthamkotta Lake

AMR surveillance of Shathamkotta Lake, Kerala was carried for *E. coli* against thirteen antibiotics and found higher resistance to cefoxitin and Ampicillin (100%) and ceftazidime (80%).

The study on enumeration and identification of *E. coli*, by fluorogenic, chromogenic and conventional methods found that chromogenic method had better recovery and can be recommended for the enumeration of *E. coli* from seafood and aquatic environment samples. The study found that the replacement of EMB media with TBX media in conventional method yielded better recovery of *E. coli*. However, fluorogenic method provided higher *E. coli* count than conventional method.

Antibacterial activity of nano particles

Zinc oxide-Bulk Particle-Chitosan (ZnO-BP-Chitosan) composite was developed and optimized for their use in controlling seafood pathogens. ZnO-BP-Chitosan showed equal zone of inhibition compared to its nano composite form i.e., ZnO-NP-Chitosan, when tested its antibacterial activity against different seafood pathogens (*E. coli, Arcobacter, Cronobacter, V.mimicus, and V.vulnificus*) were tested.



Both ZnO-BP-Chitosan composite and ZnO-NP-Chitosan exhibited higher zone of inhibition compared to Chitosan. Since, most of the food application, ZnO-NP are not recommended, the ZnO-BP-Chitosan could used to control both emerging food pathogen of seafood and aquaculture pathogens. Synergetic antibacterial effect of CuO-NP (0.5%) with chitosan (1%) was found where as no significant effect of CuO-BP with chitosan was observed.



Inhibition of E. coli by combination of CuO-NP and chitosan



The stability of SOB bacteria was studied employing stabilizing medium composed of varying proportions of glycerol (10%, 20%, 30% and 40%) and gum Arabic (10%) at different temperatures (25, 30, 37 and 45°C). The stability of SOB cultures was found high (90%) in stabilizing medium containing 20% of glycerol with 10% gum Arabic at 30°C temperature.



Biochemistry and Nutrition

Institute Projects

- Seaweeds of Indian Coast as Source of Bioactive compounds for Developing Nutraceuticals/ Functional Foods
- Novel Bio-Molecules for Food and Nutraceutical Applications from Marine Resources
- Evaluation of anti-nutritional factors (ANFs) / secondary metabolites in fish feed and feed ingredients

Most Significant Achievements

- Technology was developed for the commercial production of fucoxanthin, a high value component of seaweed.
- Fish oil supplementation in experimentally-induced metabolic syndrome in rats improved insulin sensitivity
- Standardized a non-destructive method for the estimation of phytic acid from aqua feed and feed ingredient by FTIR.
- Dietary supplementation of encapsulated anthocyanin loaded-chitosan nanoparticles attenuates hyperlipidemic aberrations in male Wistar rats.
- In vivo anti-lipidemic and antioxidant potential of collagen peptides obtained from great hammerhead shark skin waste was found to be high.
- A multiresidue method was developed where an unified extraction methodology can extract more than 250 target contaminants by liquid chromatography tandem mass spectrometry and gas chromatography tandem mass spectrometry.



Biochemistry and Nutrition

CHIEF FINDINGS

Seaweeds of Indian Coast as Source of Bioactive compounds for Developing Nutraceuticals/ Functional Foods

Principal Investigator: Dr. Suseela Mathew

Nanoencapsulation of fucoxanthin

Fucoxanthin was extracted from Brown seaweed Sargassum. The extract was dissolved in corn oil and nano-encapsulated using Vanillic acid grafted chitosan by ionic gelation method. A nano delivery system of fucoxanthin was developed using vanillic acid grafted chitosan. Zeta potential - 29mV indicated good dispersion stability. The nano capsules exhibited 82% encapsulation efficiency with an average size of 40 nm. XRD analysis indicated less crystallinity values than blank which support the encapsulation efficiency result. Cytotoxicity effect of nano capsule by MTT cell line – indicated no notable toxicity up to 166.66 µg/ml and 96 % cell viability was observed with 90.90 µg/ml treatment. This indicated its biocompatibility and safety.

Pilot scale production of Fucoxanthin from Sargassum

The optimized supercritical fluid extraction process was up scaled using the 5 L extraction vessel in SFE unit. Yield of about 2.3% was recorded, similar to the optimized lab scale experiment and its yield was higher than previously reported values for fucoxanthin. A fucoxanthin in virgin coconut oil formulation was also developed

Effect of pre-treatments on improving the bioactivity of seaweed extracts

The experiment to investigate the effect of pre-treatments on improving the antioxidant activity of seaweed extracts, indicated that subjecting seaweeds to an ultrasonication process prior to the conventional solvent based extraction significantly improved the antioxidant activity of seaweed extracts.

Nutritional evaluation of *Porphyra* indica and extraction of Porphyran

The proximate composition of *Porphyra indica* a potential high value seaweed, revealed appreciable quantity of protein (~25%). An enzymatic extraction method was optimized for extraction of bioactive polysaccharide "Porphyran" with a high yield of about ~39%.

Development of low molecular weight carboxymethylated ulvan oligosaccharides (LM-CM-UOS)

Carboxymethylated Ulvan polysaccharide was developed and characterised by FTIR. Further, Ulvan polysaccharide was hydrolyzed by reaction with hydrogen peroxide and vitamin C to form ulvan oligosaccharides (UOS). UOS were carboxymethylated using chloroacetic acid to form low molecular weight carboxymethylated ulvan oligosaccharides (LM-CM-UOS). DDPH free radical scavenging ability of the sample was estimated.

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LM-CM-UOS was found to be a promising candidate for use as antioxidant of natural origin in food-based industries for enhancing shelf-life.

Effect of process variables on yield and water absorption ratio on carboxymethylation of seaweed cellulose

An experiment was carried out to optimize the production of carboxy methyl cellulose from brown seaweed based cellulose. The effect of isopropanol volume and cellulose to monocholoroacetic acid ratio on the yield and water absorption ability was evaluated. The study inferred that a lower cellulose to isopropanol ratio and monochloroacetic acid concentration can favour the production of carboxy methyl cellulose of high water absorption ability and better yield.

Preparation of seaweed based cellulose derivatives

To comprehensively utilize the seaweed biomass, the seaweed biomass used for extraction of antioxidants by supercritical fluid extraction were further used as raw material for production of cellulose derivatives. Initially, alpha cellulose was extracted from the seaweed residue and was further subjected to etherification



process for producing carboxy methyl cellulose. For optimization of the process, concentration of NaOH and monochloroacetic acid (MCA) were considered as factor and the effect of NaOH and MCA concentration on the water solubility, degree of substitution, thermal stability and FTIR. It was observed that with increase in concentration of mono chloroacetic acid, water solubility seemed to be improved. Similarly, an increased concentration of NaOH seemed to favour the water solubility considerably.

Development of seaweed protein concentrate

A process is being developed for the preparation of seaweed protein concentrate using *Hypnea valentia* and *Sargassum species*. The protein concentrate yield ranged from 4-5% on dry weight basis and the protein content in the concentrate was in the range of 50-56%. Achieving the maximum protein recovery from seaweed is a challenge and needs a fine tuned process flow.

Utilization of seaweed for biochar preparation

Characterization of *Ulva lactuca* biochar was carried out which recommends it as a possible agent in water purification system. The yield obtained was around 50-55%. It was observed that pH varied widely from 8.5-11.5. ICP-MS analysis was carried out which exhibited the presence of exchangeable cations and showed better cation exchange with contaminant group thereby improving the adsorbent property. SEM analysis exhibited rough with varied pore size, large specific area, being a vital property for effective sorption. FT-IR spectra depicted better binding site for the biochar, indicating its suitability as a candidate for incorporating in the water purification system.

Novel Bio-Molecules for Food and Nutraceutical Applications from Marine Resources

Principal Investigator: Dr. K. K. Asha

Micro-encapsulation of nutritionally significant of vitamins and amino acids and their bio-evaluation in animal model

In-vitro release kinetic studies of vitamins loaded phenolic acid grafted chitosan micro-particles: Vitamins B₁ and B₆ loaded vanillic acid cross-linked chitosan micro-particles were synthesized and assessed for in-vitro release capacity using simulated physiological conditions. The vanillic acid cross-linked chitosan acts as a suitable wall material for the encapsulation process. The *in-vitro* release study was performed on hourly intervals for 4hrs. and that showed a controlled release of the water-soluble vitamins. Future studies are oriented towards evaluation of the *in-vivo* release pattern. The efficiency of vanillic acid cross-linked chitosan inked chitosan as secondary wall material on the thiamine and pyridoxine release pattern was studied.



Determination of molecular basis of action of bioactive molecules

PUFA rich fish oil improves insulin sensitivity in rats induced with metabolic syndrome: PUFA-rich sardine oil supplementation could prevent development of insulin resistance in rats induced with metabolic syndrome through a high-fat high fructose diet (HFHF). The impact of marine n-3 polyunsaturated fatty acids (PUFAs) rich sardine oil on the development of obesity and associated cardiometabolic dysfunction in high fat high fructose-induced metabolic syndrome in rats was investigated. Rats were fed a normal

control diet (CD), a control high-fat high fructose diet (HFD) or an HFD supplemented with n-3 PUFA rich fish oil (HFD + FO5 & HFD + FO15) for 4 weeks. It was demonstrated that diet rich in high fat and high fructose causes rats to develop obesity and its metabolic complications akin to metabolic syndrome, which was attenuated by n-3 PUFA rich sardine oil supplementation. EPA and DHA are suggested to lower insulin resistance subjects. in obese Thev were hypothesized to upregulate GLUT 4 transporters in the muscle tissue for enhanced glucose uptake. The expression of Glut4 mRNA by RT-PCR demonstrated a marked up regulation of the gene of interest









Characterization of gelatin extracted from Bigeye tuna (*Thunnus obesus*) skin

Gelatin yield obtained from tuna skin waste was 8.42 % and had relatively high hydrophobic amino acids and imino acids content which can form a thermo-reversible gel. Gelatin exhibited interfacial functional properties such as foaming, emulsifying and water-holding capacities and can be utilized in functional and food formulations, as a biomaterial in biomedical and tissue engineering applications. Molecular weight patterns of tuna skin and porcine gelatins showed all three major bands β , α 1 and α 2 with MW distribution range of 120-200 kDa. 200 kDa band is β component and two 120 kDa bands are α 1 and α 2 components.

Extraction of fish mucus and its study on biochemical constituents

Mucus from Nile tilapia collected aseptically showed positive for carbohydrate (yellow to blue-green color). Quantitative analysis indicated protein (206 μ g/ml), carbohydrates (49.6 μ g/ml) & lipid (0.04 μ g/ml). Characterization of proteins by SDS-PAGE showed two high MW protein bands of 245 & 180 kDa.

Dietary supplementation of cuttlefish protein hydrolysate in tilapia fingerlings

Dietary supplementation of cuttlefish protein hydrolysate (CFPH) at 10 to 20% level in tilapia fingerlings improved immune response against bacterial resistance, enhanced survival and thermal tolerance. Supplementation of CFPH also resulted in increase in growth performance in terms of percentage weight gain, Specific Growth Rate (SGR), Feed Conversion Rate (FCR), Food Efficiency Ratio (FER) and Protein Efficiency Ratio (PER). The fishes fed with 10 to 15 % cuttlefish protein hydrolysate in the diet showed to have enhanced growth performance and thermal tolerance capacity in fish.

Effect of dietary supplementation of encapsulated squalene on growth performance and lipid profile

Experimental animals received the standard diet and were orally administered with encapsulated squalene powder (MD-WPI based squalene powder). Groups fed with encapsulated squalene showed improved weight gain % and SGR and the effects were found to be dosage dependent. Serum cholesterol level was found to decrease with increase in squalene dosage. The increased squalene dosage in the diet lowered the cholesterol content and also Triglyceride, LDL & VLDL levels. Both the catalase and SOD activity was also found to decrease with increase in squalene supplementation. With the increase in dosage, AST activity was found to decrease significantly with brain having the highest value

Biochemistry and Nutrition



Development of stable liposomes for squalene and natural antioxidants

A preliminary study has been carried out to develop stable liposomes for squalene and natural antioxidants. A thin film hydration method was found effective in developing a stable delivery system. A protein-gum based hydrogel was developed as delivery system for squalene and anthocyanins. The in vitro release kinetics of squalene from a maltodextrin - whey protein based microparticle was compared with that of a gum Arabic based microparticle. It was observed that the maximum release has occurred in the maltodextrin - whey protein based particle at the 4th hour of in vitro digestion. The in-vitro release study emphasized that maltodectrin-whey protein can help in improving the bioavailability of squalene by providing a sustained and controlled release and thereby function as a superior substitute to gum Arabic.

Anti-ulcerogenic potential of anthocyanin loaded chitosan nanoparticles (ACNPs)

The gastric lesions, haemorrhages and necrosis in stomach was markedly aggravated in gastric-ulcer induced rats due to intubation of ethanol-hydrochloric acid (HCI-Ethanol mixture). The gastric-ulcerogenic response developed were consistently treated by the supplementation of encapsulated ACNPs. The inflammatory molecular markers, anti-inflammatory cytokines (IL-4) and proinflammatory cytokines (IFN- γ) promotes the encapsulated ACNPs for therapeutic potential of anti-ulcerogenic property. The present research findings suggested the beneficial mechanism and efficiency of encapsulated anthocyanin - loaded chitosan nanoparticles in protecting and alleviating gastric ulceration

Evaluation of anti-nutritional factors (ANFs) / secondary metabolites in fish feed and feed ingredients

Principal Investigator: Dr. Tejpal C.S.

Evaluation of black soldier fly larvae for bioconversion efficiency

The black soldier fly larvae were evaluated for the bioconversion efficiency using different waste biomass. A new spectrophotometric method was standardized for tannin estimation by screening effective solvents for extraction of tannin from feed samples, 50% acetone was most effective in giving a recovery of 70%, followed by acetone.

The nutritional composition of Black Soldier Fly Larvae (BSFL) was found to vary with the waste biomass used for the conversation purposes. The BSFL has great potential and utility in waste management since it can valorize various organic wastes and transform into high value products. The BSFL based bioconversion systems are a sustainable solution for localized management of waste disposal.



Method standardisation for the estimation of phytic acid

Standardized a non-destructive method for the estimation of phytic acid from aqua feed and feed ingredient by Fourier Transform Near-Infrared Spectroscopy. Spectral data was generated using FTNIR spectroscopy. Partial least square (PLS) algorithm was used for the qualitative and quantitative analysis. Further, the prediction model was subjected to estimate the phytic acid content in the unknown (soybean meal) sample and found to have 3.23% of phytic acid in the soybean meal.





Engineering

Institute Projects

• Engineering interventions in post-harvest sector

Most Significant Achievements

- Developed an improved version of solar-powered refrigerated fish vending kiosk with DC compressor
- Fabricated and evaluated the performance of solar powered fish feed dispenser
- Performance of multipurpose biomass dryer and mini fish descaling machines were carried out
- Designed and developed a commercial pilot scale model of hot air assisted continuous infrared drying system for high value fishery products
- Developed the prototype of a multi-purpose solar thermal conversion system with gasifier heat backup

CHIEF FINDINGS

Engineering interventions in post-harvest sector

Principal Investigator: Dr. George Ninan

Performance evaluation of multipurpose biomass dryer

Performance evaluation studies were carried out in the newly developed multi-purpose biomass dryer (20 kg capacity) with anchovy (*Stolephorus commersonnii*) and shrimp (*Metapenaeus dobsoni*). The dryer consisted of a drying chamber, blower, biomass furnace, and hot air re-circulatory system. The moisture



content of anchovy and shrimp was reduced from 79.50% to 15.35% and 84% to 14.66% (on a wet basis), respectively within 3.5 h of drying. The rehydration ratio of dried anchovy and shrimp was 2.2 and 2.4, respectively. Based on Fick's law of moisture diffusion, effective moisture diffusivity values of 6.0139×10^{-7} m²/s and 1.78×10^{-6} m²/s were obtained for dried anchovy and shrimp, respectively. The energy efficiency of the biomass dryer was calculated to be 25.9%.



Rehydration ratio of dried anchovy and shrimp as a function of time



Drying time vs Moisture content



Shrimp drying process in biomass dryer (a) raw shrimp (b) shrimp loaded in dryer (c) drying of shrimp (d) final dried shrimp


Performance evaluation of solar-powered mobile fish vending kiosk under no-load and loaded conditions

ICAR-CIFT, Cochin, in collaboration with research partner M/s Lanasol Energy Solutions, Pvt Ltd, Bangalore, jointly designed and developed a low-cost energy-efficient solar-powered refrigerated fish vending kiosk to sell fish and fish products. The kiosk chilled chamber volume was about 135 L with a fish carrying capacity of 30 kg at the temperature of 2-3°C. The unit was powered by a 450 W polycrystalline Photovoltaic panel, supported by a 150 Ah lead-acid battery. The results showed that under the no-load condition the kiosk took about 2-2.5 h to reach the temperature of 2-3°C and under loaded conditions it required about 3.5 h for obtaining the set temperature. Further design modifications in the prototype is under process to verify the chamber temperature fluctuations during day long storage as well as to synchronize the display and cabinet temperature during storage.



Photograph of the solar-powered mobile fish vending kiosk (a) under no load (b) loaded with fish



The temperature profile of the solar-powered mobile fish vending kiosk (a) under no load (b) loaded with mackerel



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A N N U A L

Development of an improved version of solar-powered refrigerated fish vending kiosk with DC compressor

Designed and developed a refrigerated mobile fish vending kiosk to sell fish under hygienic conditions to the consumers. Preliminary trials revealed that the system requirement of an AC power source for operation limited the usage of the vending kiosk at the field level. To overcome this limitation, collaborative research work was taken up by the institute with M/s yeSeN SUSTAIN, Kochi to work on a solar-charged battery-operated refrigeration system with a DC compressor which is envisaged to get recharged during sunshine hours. The fabrication work of the prototype of a solar-powered refrigerated fish vending kiosk has been completed and studies are being carried out on temperature profiling of chilled chamber.



Photograph of refrigerated fish vending kiosk with solar PV and DC compressor

Performance evaluation of solar powered fish feed dispenser

A performance evaluation study was carried out on the automatic fish feed dispenser. The performance of the prototype was evaluated with different sizes of feed pellets (1.2, 2.5, 5 mm) at various motor speeds. It was found that an increase in feed size and the rotational speed increased the feed dispensing distance. It was also observed that the time required to dispense the feed was directly proportional to the feed size. The study concluded that further field-level trials are required to improve the performance of the developed system. For the dispenser movement in



Evaluation of solar-based feed dispensing system

the water, a paddle wheel and motor arrangement fabrication is under progress.

Work on multichannel data logger data transmission system

A detailed study was done on the data logger (EMCON, Kochi) attached with solar-LPG hybrid dryer for implementing an additional feature of retrieving data through the internet using IoT. The existing unit is capable of reading and capturing fourteen parameters including the air temperature, chamber temperature, wind velocity, relative humidity, dry temperature, solar radiation, weight loss, etc. These sensor data have been



sent to the multiplexer (MUX) from the sensor and then converted to TTL (transistor logic) from UART (universal asynchronous receiver-transmitter) using max232 converter IC. It was connected from the UART to the TTL converter i.e., transmitter and receiver connect with a single board microcontroller (Arduino) to fetch the data directly to our system for further transmission to the internet for ease of access.



Internal view of multichannel data logger installed in the solar-LPG hybrid dryer

Performance evaluation of mini fish de-scaling machine

Performance evaluation of the commercially model of mini fish descaling machine was carried out with sardine fish at variable operating conditions. The portable type motor-operated fish descaling machine consisted of a rotating drum with a centrally spaced rod, motor, and frame assembly. Fish descaling was found to have 88% efficiency for a loading capacity of 1 kg with a processing time of five minutes for sardine fish.



Performance of mini fish descaling machine (a) fresh sardine (b) descaling drum (c) descaled sardine

Nutritional analysis of shrimps dried in different dryers

The nutritional profiling, fatty acid composition, mineral analysis of shrimps dried under two different dryers were analyzed. It was found that the color of shrimps and astaxanthin was better preserved in the biomass-based dryer. The mineral content was observed to be affected by the type of drying with the biomass type of dryer having a positive effect in retaining the minerals. Irrespective of the type of drying adopted, calcium followed by phosphorous, potassium, sodium, and magnesium were the predominant



major elements in the dried shrimp. The levels of micro minerals (Zn, Cu, Fe, and Mn) analyzed were also within tolerable limits. A similar effect was observed in the fatty acid composition with biomass type of drying having a positive effect in retaining the lipids. Irrespective of the type of drying, shrimps recorded high content of polyunsaturated fatty acids.

Drying kinetics, modeling, and quality evaluation of Bombay duck dried in solar-LPG hybrid dryer

The drying kinetics and quality of Bombay duck (*Harpodon nehereus*) dried in a solar-LPG hybrid dryer were determined and empirical modeling of drying data was carried out to find the best fit model. The drying experiment was carried out for 11hrs. at a drying air temperature of 55.5 ± 0.75 °C. Relative humidity and velocity of drying air inside the drying chamber were $66\pm0.6\%$ and 0.8 ms⁻¹ respectively. The moisture content of Bombay duck was reduced from $86.4\pm0.52\%$ to $16.4\pm.67\%$ within 11hrs. of drying. The rehydration ratio and shrinkage of dried Bombay duck were found to be 1.94 and 26.42\%, respectively. Optimum drying conditions were maintained inside the dryer by an LPG heat backup system. Drying characteristic data were fitted into empirical drying models. Page model was found to be the best fit for the drying characteristic data under specified conditions (R²=0.9986, RMSE=0.00126, and χ^2 =0.000134). Microbial analysis of dried fish samples was found to be within the safer limits. The maximum collector and drying efficiency of 40.67% and 33.7% were obtained for drying Bombay duck in the solar-LPG hybrid dryer.



Drying rate of Bombay duck as a function of time



Instantaneous collector and drying efficiencies during solar-LPG hybrid drying of Bombay duck

Extension, Information and Statistics

Institute Projects

- Evolving SMART EDP module for livelihood security of small scale fisherfolk through fish-preneurship
- Occupational structure, labour productivity and labour migration in the fisheries sector
- A study on the entrepreneurship ecosystem in fisheries and the cybernetics of Women Initiated Enterprises in Fisheries (WIEF) in selected coastal states of India
- Assessing the input and service delivery system for marine fisheries in Kerala
- An Assessment of Extension System in Marine Fisheries Sector of Kerala

Most Significant Achievements

- Necessity for formal health and safety reporting mechanism on-board fishing vessels and awareness
 levels were low among fishers on need for formal training on Occupational Safety and Health (OSH).
- In marine fisheries sector health related information was the most assessed information followed by ocean forecast and safety information and credit, subsidy and insurance were least accessed information's.

CHIEF FINDINGS

Evolving SMART EDP Module for livelihood security of small-scale fisher folk through fish-preneurship

Principal Investigator: Dr. A.K. Mohanty

In the study of gender role in entrepreneurship development in fisheries between male and female, significant differences were found with respect to social, political and technological field and both positive/ negative correlations were observed between the variables with respect to male and females, separately.



Study of gender role in fishpreneurship w.r.t. socio-psychoeconomic-politic and technological parameters

A total number of 92 beneficiaries from three different states namely Kerala (45), Andhra Pradesh (24) and Gujarat (23) selected from the experimental group identified under the research project were interviewed to study the gender role in developing entrepreneurship in fisheries. Result showed a significant mean difference among all the independent variables like social, psychological, economic, political and technological attributes with respect to dependent variable i.e. gender role in entrepreneurship development in three different states. Mean score was found to be higher in Kerala as compared to Gujarat and AP in respect of variables like social, psychological attributes, whereas the mean score was observed to be higher in Gujarat in case of economic attributes and in the technological field it was higher in Andhra Pradesh. All the variables were found to be significant (p <0.001). Remarkably, a significant difference was observed between male and female with reference to gender role in fisheries entrepreneurship development in social, political and technological field.

It was observed that in case of female, there was a positive correlation between the variables viz., social and

psychological (r=0.685), social and political (r=0.430) with p value <0.001 and 0.041, respectively. In the same line, in case of males, the study observed high degree of significant positive correlation between the variables social and psychological (r=0.545), social and political (0.674) and moderate degree of positive correlation psychological between and political field (r= 0.374) (p < 0.001). Negative correlation was found in social and economic (r = -0.543), economic and political field (r = -0.420) with p value 0.007 and 0.046, respectively in females. Similarly, social and economic (r = -0.548), social and technological (r = -0.448), psychological and economic (r = -0.441), political and technological field (r = -0.538) were negatively correlated with significant p value < 0.001 in males.





2

Occupational structure, labour productivity and labour migration in the fisheries sector

Principal Investigator: Dr. Nikita Gopal

Occupational Safety & Health of fish workers on-board trawlers

Studies on Occupational Safety and Health (OSH) of workers on-board fishing vessels revealed multiple sources of risk relating to physical environment, biological environment, fishing location, as well as a broad range of social, economic and cultural factors. Direct risks included those related to the design and maintenance of the fishing vessels and equipment, handling of the gear, lack of safety equipment and sea safety training, as well as human error. The study conducted among trawler workers found that 25% of respondents were young and in-experienced and about 60% of the labour force were migrants from states like West Bengal, Odisha and Tamil Nadu. Work injuries and illnesses were more among inexperienced workers and majority of fishermen had minor injuries like bruises during their work but considered it normal during their work. There was no formal health and safety reporting mechanisms in the fishing vessel. Fishing vessel owners didn't offer training on OSH while recruiting as well as fishers and owners were not aware of the updated Government of India labour code relating to OSH.

A study on the entrepreneurship ecosystem in fisheries and the cybernetics of Women Initiated Enterprises in Fisheries (WIEF) in selected coastal states of India

Principal Investigator: Dr. Ashaletha S.

Specific features of entrepreneurship in Women Initiated Enterprises in Fisheries (WIFE) were compared with features of classical entrepreneurship. Reason to start, trend of growth, the nature/stability of leadership, the motive of the team, dynamism of management, the nature of idea based on which the enterprise was initiated, the market share and extent of reach of the enterprise among clients were studied to elicit the nodal points to focus during the study. Based on results, it was also concluded that WIFEs were mostly small businesses or necessity based enterprises and not classical entrepreneurship.

As next step, to select and customize domains of evaluative frame work, frameworks developed by nine international agencies were compared and common parameters were validated by stakeholders for relevance and finalized. Combination of primary and secondary data collection are being done at micro, macro and meso levels of entrepreneurial eco system.

4

Assessing input and service delivery system for marine fisheries in Kerala

Principal Investigator: Dr. A. Suresh

The status of service delivery system in marine fisheries with respect to credit, ice, infrastructure, marketing facilities, sea safety equipment and information for fisherfolk (both artisanal and mechanized) and fish vendors was examined using primary data collected from Kerala. Further, the trends in exports of marine products and its determinants; extension services and its regional and temporal variations for agricultural sector in general and fisheries sector in particular and impact of fisheries development in poverty and nutritional security were analyzed.



Fish and fish products exports: Trends and determinants

Data on country wise fish export from India was collected and analyzed the trends and determinants. A total of 26 countries constituting more than 90% of India's marine products exports were included for the analysis. The growth rate of fish export to various destinations and its instability were analyzed using econometric methods. Compared to the period 2000-01 to 2009-10, the exports exhibited higher trends in growth during 2010-11 to 2019-20 (5.7% and 10.2% respectively), mainly due to contribution by frozen shrimp. The higher growth was associated with higher level of instability (0.99% compared to 2.6%, in respective periods), for all the products except live animals, pointing to increased risk and vulnerability of Indian marine products exports to economic shocks. Exports to all the major destinations exhibited higher growths during the second period. The panel data regression indicated that GDP of the export destinations, exchange rate and membership in WTO were the key factors that was associated with the export.

Fish Vending: Constraints and policy for mainstreaming

Profiling of fish vendors with reference to the vending practices, constraints faced by them, and the policy gaps in mainstreaming the fish vendors was done based on the primary data collected from fish vendors of Kerala. Fish business was a traditionally practiced occupation for 53% of the participants. The profession was gendered with 77% being male and 23% female. Access to inputs and services as well as space for fish vending was skewed in favor of men. Gender, access to capital and mode of fish vending were the major layers that determined the monthly income. About 41% had monthly income less than Rs 10000, and 93% had income less than Rs 25000. With the entrance of capital, fish vending was gradually transforming and shedding its regional and caste hues. About 14% vendors entered the profession vying for higher profits. The technology options required to uplift fish vending need to consider different typologies/ segments with respect to vending: they includes shops (39%), head load vending (16%), mobile vending (25%) and petty traders (20%).

Fish vendors access to credit

Fish business requires flow of capital, but the study on fish vending indicated that 45% did not avail credit. For those who availed credit, 17.5% availed credit to the tune of Rs. 0.5 - 1 lakh and 60% in the range of amount Rs.1 lakh and above. The penetration of the formal sector credit was to the extent of 35% of total sample and more than 50% for those availed credit.

An Assessment of Extension System in Marine Fisheries Sector of Kerala

Principal Investigator: Dr. Sajesh V. K.

An assessment of extension priorities of the marine fishermen in Ernakulam district of Kerala revealed that weather related information was the most accessed information (100%) followed by ocean state forecast (OSF) and safety information (86.67%). Fishermen accessed this information using traditional and modern ICTs. Information related to innovations in craft and gear technologies were accessed by majority of the fishermen. Least accessed information included information related to credit (13.34%), subsidy (6.67%)



and insurance (3.34%). Preliminary survey among peeling units revealed that information related to various Government schemes and credit as the major information needs. While in drying units' the information needs included technological innovations in fish drying and hygienic handling during preprocessing

Training needs expressed by majority fishermen (56.67%) were fabrication and use of square mesh codends and deep sea fishing. Use of safety equipment was the training need expressed by the least number of fishermen (10%).

Thematic analysis of the marine fisheries extension system has identified major themes like human resource related issues, issues related to technology transfer, networking and linkage issues in the context of access to extension by fishermen. Though the presence of multiple agencies in the fisheries extension system added strength to the technology dissemination and livelihood development activities, lack of coordination constrained the effectiveness of extension. Further, Up-scaling and out- scaling the present initiatives were required to enhance the reach and hence to benefit most of the fisher folk

Expenditure on extension as proportion of gross state value added: Expenditure on extension as proportion of Gross state value added is higher in crop sector compared to fisheries sector. Except, during the period 2015-2017, it remained less than or equal to 0.1 % in case of fisheries extension.

Temporal variation in membership in fisheries co-operatives: A considerable increase in number of membership in fisheries co-operatives of Kollam, Alappuzha and Ernakulam during 2016 compared to 2005 and 2010 was observed.







Externally Funded Projects

INTERNATIONAL PROJECTS

- 1. Diagnostics for one health and user driven solutions for AMR (DOSA)
- 2. North East India One Health Study on Transmission Dynamics of Antimicrobial Resistance (NEOSTAR)
- 3. Establishing value chain for fish: Towards nutritional security for rural population
- 4. Future Refrigeration India: INDEE+ (Indo Norwegian project)
- 5. Support mitigation of Antimicrobial Resistance (AMR) risk associated with aquaculture in Asia

NATIONAL PROJECTS

- 6. Global warming potential of mechanized fishing methods of India and mitigation strategies; Analysis using LCA and DEA approach
- 7. Zonal Technology Management (ZTM) Agri Business Incubation (ABI) Centre
- 8. All India Network Project on Fish Health
- 9. Biomodulation of Marine Biopolymers for the preparation of biomaterials of healthcare importance
- 10. Network programme on Assessment of Antimicrobial Resistance (AMR) in microorganisms associated with fisheries and aquaculture in India
- 11. Monitoring of heavy metal content in finfish and shellfish along the coast of India and possible mitigation measures
- 12. Upgradation of Food testing Laboratory at ICAR-CIFT, Cochin MOFP (I) 2020 Installation of Modern Analytical Instruments
- 13. Design and development of hot air assisted continuous infrared drying system for high-value fish and fishery products



- 14. Development of Portable Fish Freshness Assessment Sensor
- 15. Natural Levels of Formaldehyde in Freshly Harvested Finfish and Shellfish Species
- 16. FSSAI-National Reference Laboratory
- 17. Network for Scientific Co-operation for Food Safety and Applied Nutrition (NetSCoFAN)
- 18. Development of a foldable smart live fish transportation system for distant trade of table fish
- 19. Determining seasonal and spatial occurrence of multiclass endocrine disrupting chemicals in the fishes, crustaceans and molluscs of the Vembanad urban estuary: risk assessment by an untargeted metabolomics approach
- 20. Green, clean and affordable energy for fishermen Community: Development of a multipurpose solar thermal conversion system with gasifier/biomass heater backup
- 21. Improved coconut wood canoes for small scale fishing sector of southeast coast of India
- 22. National surveillance programme for aquatic animal diseases
- 23. Screening lytic phages from diverse marine and aquatic niche for controlling bacterial pathogens associated with aquaculture and post-harvest fish quality
- 24. Validation and dissemination of Ocean state forcast advisories along Gujarat Coast
- 25. Marine fishery in Kerala- A study on evolution of policy, cost and earnings of fishing units and income of fisher households







INTERNATIONAL PROJECTS

Diagnostics for one health and user driven solutions for AMR (DOSA)

Principal Investigator: Dr. G. K. Sivaraman

Funding Agency: Department of Biotechnology (DBT) -Indo-UK Collabrative project

Total Budget: Rs.98.30 Lakhs

PCR-based replicon typing (PBRT) of ESBL- producing E. coli and K. pneumoniae strains: Predominance of IncFIA & IncFIB plasmids were noticed in ESBL-producing E. coli; however, in K. *pneumoniae*, the major replicon type detected was IncHI1.

Methicillin-Resistant Staphylococci (MRS) and their resistance profile: Methicillin-resistant Staphylococci was present in 13 out of 37 aquaculture farms screened. The isolates were resistant to erythromycin (76%), norfloxacin (53%), trimethoprim-sulfamethoxazole (51%) and gentamicin (36%).

Paper based and DPA strips that can test antibiotic residues from shrimp, fish feed and water for ampicillin, amoxicillin, carpenicillin, cephalothin, cefoxitin, cefazolin and cloxacillin from 4 ppb to 30ppb MRLs and LODs of 1 to 100ppb is under field evaluation study among shrimp farmers, fish processing industry and MPEDA, Cochin.

North East India One Health Study on Transmission Dynamics of Antimicrobial Resistance (NEOSTAR)

Principal Investigator: Dr. G. K. Sivaraman

Funding Agency: Department of Biotechnology (DBT) -Indo-UK Collabrative project

Total Budget: Rs.74.31 Lakhs

Characterization of virulomes and biofilm genetic determinants of Methicillin-Resistant Staphylococci (MRS)

The most prevalent resistance profile of MRSA isolated from fish market in Assam was ampicillincefazolin-cefoxitin-gentamicin-norfloxacin-oxacillin-penicillin. *Agr* III type MRSA (78.26%) were found to be predominant. Four isolates (17.39%) carried type IV SCC*mec* elements, while other isolates carried diverse loci of mec and cassette chromosome recombinase (ccr) complexes. Further, two SCC*mec*-IV MRSA isolates carried panton-valentine-leucocidin (PVL) toxin genes and were resistant to macrolide in addition to beta-lactams, the molecular marker of community-associated MRSA (CA-MRSA). MLST and *spa* typing identified all MRSA as ST88 with spa type t2526. This was the first report from India on the incidence of ST88-SCC*mec*-IV (ST88-IV) MRSA in the fishery environment.



Antibiotic resistance among E. coli and K. pneumoniae recovered from three pre-determined sites in Guwahati

Extended-spectrum beta-lactamase (ESBL) producing Enterobacteriaceae from retail markets

Fishes from retail markets from Assam revealed multiple antibiotic resistance (MDR) in *E. coli* and *K. pneumoniae* with MAR index ranging from 0.26 to 0.63. Molecular characterization of ARGs revealed the presence of CTX-M group 1(CTX-M-15) in majority of *E. coli* and *K. pneumonia* isolates. Plasmid mediated quinolone gene determinant qnrS was present in all ESBL- *E. coli* isolates and 83% of the ESBL- *K. pneumonia*. Novel ST's of *K. pneumonia* ST 43, ST48, ST1419, ST307, ST5554, ST5555, ST18, ST152, ST307, ST133 and *K. quasipneumoniae subsp.* ST1699 from the fish retail market samples, Assam based on WGS analysis.

3 Establishing value chain for fish: Towards nutritional security for rural population

Principal Investigator: Dr. Ravishankar C. N.

Funding Agency: World Fish

Process of Development of fish dry powder

In collaboration with Worldfish, Odisha Govt. and ICAR-CIFT, Cochin, a program was chalked out to supply dried fish and dry fish powder to children of rural and tribal districts of Odisha. The raw material used was Anchovy, a small marine fish with good nutritional value which was processed into fish powder and the standardized technology was transferred to entrepreneur. The hygienically dried, pulverized and vacuum packed product was supplied to selected fifty Anganwadi centres of Mayurbhanj District, Odisha. The detailed steps for the product development are given below.





A total of 2376 Kg (4,950 packets) of dried anchovy fish and 1200 Kg (8,000 packets) of dried anchovy fish powder were supplied to the beneficiaries in Odisha.

Dried fish powder from Anchovy



Process of fish dry powder preparation

Study on fish consumption pattern at Odisha and Karnataka

The fish consumption pattern of people at Khurda district, Odisha showed that, 74% of the respondents consumed fish 2-3 times a week and 17% consumed fish weekly once. The major fishes consumed included *Catla catla. Labeo rohita, Hilsa ilisha, Pangasius sp., Pampus argenteus, Labeo bata, Clarius betrachus, Chanos chanos.* Studies carried out at Chamrajanagar District, Karnataka indicated that 61% of the respondents consumed fish weekly and 9.5% consumed fish 2-3 times a week.





4 Future Refrigeration India: INDEE+ (Indo Norwegian project)

Principal Investigator: Dr. C. N. Ravishankar

Funding Agency: Norwegian University of Science and Technology (NTNU), Norway

Total Budget: 80.00 Lakhs

As part of the project, A two-day workshop cum sensitization program was conducted at ICAR-CIFT, Kochi from 29-30 November 2021. The program was conducted for seafood processing industry representatives along with Govt. officials. Few seafood industries and CIFT fishing vessels were visited to study the implementation of the R744 refrigeration demonstration unit as part of the workshop. Methodology for finalizing the objectives, materials, technical program, and a roadmap with a timeline for the project was done. A simplified thermodynamic tool to analyze the system was developed by the team members. In the first phase, the condensing/gas cooler unit received from NTNU, Norway will be modified to an R744 refrigeration training unit. The modification will include designing and fabrication of parallel compression and internal heat exchanger to improve the performance at high ambient temperature conditions of Kochi.

5 Support mitigation of Antimicrobial Resistance (AMR) risk associated with aquaculture in Asia Principal Investigator: Dr. B. Madhusudana Rao

Funding Agency: Food and Agriculture Organization (FAO)

Total Budget: 25.86 Lakhs

Surveillance of AMR in Andhra Pradesh

Monoculture was being practiced primarily in pangasius fish farms (67%) whereas rohu fish farms were basically polyculture farms with *Catla catla* (65%). Disease incidence was reported in 27.5% of pangasius farms and 17.5% of rohu fish farms. 17.5% of pangasius farms and 7.5% of rohu farms reported the use of antibiotics for treatment of fish diseases. None of the fish farmers were aware of antimicrobial resistance and its implications to human health, terrestrial animal health and aquatic animal health. *E.coli* (n=76) were isolated from the intestines of pangasius and rohu fish and *Aeromonas* spp. (n=76) were isolated from the gills of pangasius (n=39) and rohu fish (n=37). Ten out of the 76 *Aeromonas* spp. isolates were confirmed as *A. hydrophila*. Higher resistance of the *E.coli* isolates was observed towards nalidixic acid and tetracycline whereas higher resistance of the *Aeromonas* spp. isolates was observed towards and cefoxitin. Multi-drug resistance (MDR) was higher in *E.coli* compared to *Aeromonas* spp.





Base line survey on antimicrobial use





NATIONAL PROJECTS

Global warming potential of mechanized fishing methods of India and mitigation strategies; Analysis using LCA and DEA approach

Principal Investigator: Dr. Leela Edwin

Funding Agency: National Innovations in Climate Resilient Agriculture (NICRA)

Total Budget: 69.00 Lakhs

Global Warming Potential (GWP) analysis of construction of fishing vessels, gear and operation

GWP analyses were carried out under the project for construction and operation of longliner cum gillnetter, purse seiner and trawler. Longliner cum gillnetter operation GWP analysis revealed that medium longliners produce 2.22 kg CO_2eq/kg of fish landed, whereas large vessels contribute 2.31 kg CO_2eq/kg of fish landed. For medium and large purse seiners, the GWP was 0.45 and 0.70 CO_2eq/kg of fish landed, respectively. The GWP of medium trawlers was 3.5 kg CO_2eq/kg of fish landed, while large trawlers had a GWP of 2.6 kg CO_2eq/kg of fish landed. Steel used for construction of fishing vessels accounted for 91.9% of GWP. For fishing operation diesel derived emission to air contribute more to GWP followed by gear.



Hotspot analysis of fishing operations

Life Cycle Assessment of Energy efficient fishing vessels: LCA analysis were conducted using the operational details of ICAR-CIFT designed energy efficient fishing vessel (constructed under the Blue Revolution Scheme). The GWP analysis of blue revolution scheme steel fishing vessel showed 6.8% lesser emission of CO_2 eq. compared to commercial steel fishing vessel. The boat building material, steel contributed maximum to GWP compared to other inventories used in construction process of these vessels.



Construction of pedal fishing boat: Constructed FRP pedal fishing boat (L_{OA} 4 m) for reservoir fishing. After successful field trails, the pedal fishing boat was handed over to Peechi SC/ST Reservoir Fisheries Co-operative Society, Peechi, Kerala, for performance trials.



Handing over the pedal boat to Peechi SC/ST Reservoir Fisheries Co-operative Society



Handing over the FRP boat to Paravur Scheduled Caste-Scheduled Tribe Service Cooperative Society

Zonal Technology Management (ZTM) – Agri Business Incubation (ABI) Centre

Principal Investigator: Dr. George Ninan

Funding Agency: Indian Council of Agricultural Research (ICAR) Salient achievements: Brief outline of activity is given in pages (155 - 160)



All India Network Project on Fish Health

Principal Investigator: Dr. Ashok Kumar K.

Funding Agency: Indian Council of Agricultural Research (ICAR)

Total Budget: 80.00 Lakhs

Different antibiotic drug residues viz., florfenicol and its amine, Emamectin, Oxytetracycline and Oxolinic acid etc. in fish tissue, gill, bile, plasma, intestine, liver and kidney portions were extracted and analysed using 4000 QTRAP mass spectrometry. The experimental analysis focused on withdrawal and pharmacokinetic analysis of florfenicol and its amine in different species like *Pangasianodon hypophthalmus, Rainbow trout, Trachinotus blochii, Oreochromis niloticus* etc. The execution of wet laboratory experiments was carried out in different partnering institutes under the project and the sample extraction, method development/ standardization for estimation of drug residues and LC-MS/MS data interpretation were carried out at ICAR – CIFT, Cochin.



Chromatogram of florfenicol and its amine at 100µg/kg in spiked fish matrix

Total number of 2500 treated samples including internal organs were extracted and analysed for the study. The LC-MS/MS analysis of different drug residues in spiked samples showed good linearity with an accuracy of 90- 110% and a correlation coefficient (r) of 0.99.

Emamectin benzoate residue analysis study evaluated the influence of 14 days of EB dosing at 0-10 times the recommended dose (1X: 50µg/kg biomass/day) on the biological responses and accrual/depletion of EB residues in *Oreochromis niloticus* and *Golden mahseer* fish species. A significant dose dependant reduction in feed intake and increase in mortalities during the Emamectin dosing period was observed.

Oxytetracycline study evaluated the safety of OTC in *Pangasianodon hypophthalmus*, Rainbow trout **and** *Oreochromis niloticus* administered with the antibiotic in feed at the dose rate of 80- 800 mg/kg. The study establishes that in-feed administration of the antibiotic Oxytetracycline @80 mg/kg fish biomass is safe for therapeutic use in fish. The pharmacokinetic parameters of oral route were also compared and drug concentrations were measured in various tissues of *Pangasianodon hypophthalmus* at different time intervals by QTRAP Mass spectrometry.

Externally Funded Projects



Biomodulation of Marine Biopolymers for the preparation of biomaterials of healthcare importance

Principal Investigator: Dr. R. Anandan

Funding Agency: Indian Council of Agricultural Research (ICAR)

Total Budget: Rs. 57.00 Lakhs

Encapsulation of anthocyanin in natural biopolymers is an emerging and evolving area of research that improves the diversification of various new avenues in the fields of age and diet-related hepato-

regenerative disease. The study explored the hypolipidemic effect and mechanism of dietary supplementation of ACNPs in male Wistar rats, fed on experimental high fat-alcohol diets. The western blotting experiments revealed normalization of the fatty acid synthase (FAS), and HMGCR (Hydroxymethylglutaryl Co-A reductase) activities after supplementation with ACNPs. The study concluded that the ACNPs were promising functional dietary supplement with definite hypolipidemic activity.



Hypolipidemic effect of Encapsulated Anthocyanin particles

Biomodulation of biopolymeric materials for human healthcare is an active and promising area of research. Chitosan nanoparticles grafted fish gelatin bio-nanocomposite membranes were prepared and their physical and structural properties were characterized using scanning electron microscopy (SEM) and atomic force microscopy (AFM). The microstructures of bio-nanocomposite membranes were well defined with relatively smooth surface, interconnected pores and voids. The results demonstrated that chitosan nanoparticles grafted fish gelatin bio-nanocomposite membranes had good potential for biomedical and tissue engineering applications.





SEM - fish gelatin bio-nanocomposite membranes

The oral supplementation of Fish Collagen Peptides (FCP) in high fat diet alcohol fed experimental rats confirmed the regulation of body weight to normal level. Histopathology analysis of liver tissues demonstrated that the FCP treated group maintained normal liver parenchyma with moderate inflammatory infiltration, whereas the statin treated group developed centrilobular fibrosis, atrophy of hepatocytes and moderate inflammatory infiltration. Oral dietary supplementation of FCP enhanced the activity levels of both superoxide dismutase and catalase enzymes and, lowered the levels of lipid peroxidation in liver tissues.



Histopathology of liver tissues treated with Fish Collagen peptides

Externally Funded Projects



10 Network programme on Assessment of Antimicrobial Resistance (AMR) in microorganisms associated with fisheries and aquaculture in India Principal Investigator: Dr. M. M. Prasad / Dr. B. Madhusudana Rao

Funding Agency: Indian Council for Agricultural Research (ICAR)

Total Budget: 10.00 Lakhs

A total of 55 shrimp samples collected from 35 aquaculture farms in Kerala (19 farms from Thrissur district and 16 farms from Alappuzha district) of Kerala and 20 aquaculture farms of Andhra Pradesh (16 shrimp farms of East Godavari and 4 shrimp farms of West Godavari district) were screened for the presence of *E. coli, Staphylococcus* (Coagulase positive *Staphylococci* and Coagulase negative *Staphylococci*) and *Vibro* spp. (*V. parahaemolyticus* and Other *Vibro* spp.). 88.5%, 100%, 48.5% of the shrimp aquaculture farms from Kerala harboured *E. coli, Staphylococcus* spp., and *Vibrio* spp., respectively. Among of the farms screened, 87.5%, 100%, 50% of Alappuzha farms harboured *E. coli, Staphylococcus* sp., and *Vibrio* sp., respectively. About 84.2%, 100%, 47.3% of Thrissur farms harboured *E. coli*, *coli*, *Staphylococcus* sp., and *Vibrio* sp., 100%, 47.3% of Thrissur farms harboured *E. coli*, *coli*, *coli*,



AMR of bacteria isolated from shrimp

Staphylococcus sp., and *Vibrio* sp., respectively. Among the farms from Andhra Pradesh higher resistance of *Vibrio* spp., was found to Amoxicillin/clavulanic acid (45.4%) > ceftazidime (27.2%) > Gentamicin and Cefotaxime (9%).



Data and sample collection from Shrimp farm in Andhra Pradesh



Monitoring of heavy metal content in finfish and shellfish along the coast of India and possible mitigation measures

Principal Investigator: Dr. Satyen Kumar Panda

Funding Agency: Indian Council of Agricultural Research (ICAR)

Total Budget: 50.00 Lakhs

Violation of FSSAI limits were observed in 17% of samples for Hg, 1.16% for Pb and 0.85% for Cd.

Heavy metal data of 279 commercial samples of fish and fish products were submitted to FSSAI for risk assessment studies



Upgradation of Food testing Laboratory at ICAR-CIFT, Cochin MOFP(I)2020 Installation of Modern Analytical Instruments

Principal Investigator: Dr. Ravishankar C. N.

Funding Agency: Ministry of food Processing India (MoFPI)

Total Budget: 09.98 Lakhs

The equipments purchased under the funding includes High resolution accurate mass LC-MS/MS, FT NIR, Oxygen Transmission Rate Tester, Biosafety Cabinet, Autoclave, Stomacher Large Volume, Stomacher Normal Volume, Circulating Water Bath, Hot Air Oven, Microbiological Incubator and Shaking Incubator.



High resolution accurate mass LC-MS/MS



FT NIR

Externally Funded Projects



13 Design and development of hot air assisted continuous infrared drying system for high-value fish and fishery products

Principal Investigator: Dr. Aniesrani Delfiya D. S.

Funding Agency: The Ministry of Food Processing Industries (MoFPI)

Total Budget: 27.02 Lakhs

Optimization of drying conditions for shrimp and anchovy fish

Performance evaluation of the prototype of a hot air-assisted continuous infrared dryer were conducted using shrimp and anchovy fish. Optimization of drying conditions of shrimp and anchovy fish was done based on the drying and quality characteristics of shrimp and anchovy fish.

Shrimp drying in hot air-assisted continuous IR dryer

The effect of infrared radiation (IR) intensity, drying air temperature, and emitter-sample distance on drying time, specific energy consumption (SEC) and effective moisture diffusivity were investigated to optimize the drying process of shrimp in the dryer. Statistical analysis revealed that all process factors significantly ($p \le 0.05$) affected the response factors. The optimum values of IR intensity, air temperature, and emitter-sample distance for shrimp drying were found to be 2300 W/m², 55°C, and 10 cm, respectively with a maximum desirability value of 0.983. Shrimp dried at optimum conditions were analyzed for its quality characteristics and found with better dehydration and physical characteristics.



Hot air assisted continuous infrared dryer Shrimp drying in the hot air-assisted continuous infrared dryer





Drying of anchovy in hot air assisted continuous infrared dryer

Evaluation of drying characteristics and optimization of drying conditions for small and large size anchovy fish were performed in the hot air-assisted continuous infrared dryer. The experiments were carried out at different infrared intensities and different IR source-sample distance. The impact of IR intensity and distance between the IR source and sample on response factors such as moisture content, drying efficiency, drying time, specific energy consumption, water activity, rehydration ratio, shrinkage, and colour value were evaluated using statistical analysis. The most efficient drying conditions for small anchovy and large anchovy were found to be 2000 W/m², 10 cm, and 2000 W/m², 5 cm, respectively. Minimum drying time (1.5 h), specific energy consumption (1.37 kWh/kg of water evaporated), water activity (0.53), shrinkage (26.78 %), colour change (7.34) and maximum drying efficiency (45.56%), rehydration ratio (2.15) were observed at 2000 W/m² and 10 cm for small anchovy. There were variations in the parameters with difference in the size of the fish. This study indicated the potential application of a hot air-assisted infrared drying system to acquire dried anchovy with high quality and increased shelf life.



Anchovy drying in hot air assisted continuous infrared dryer

Design and development of a pilot-scale model of hot air assisted continuous infrared dryer

The major components of the pilot-scale dryer comprised of belt conveyor, infrared radiation heating system, hot air generation and circulation, power transmission, feed hopper, discharge chute, and control panel. The drying chamber of 2.22 x 1.19 x 1.30 m was made from stainless steel sheets insulated using 25 mm thickness glass wool with doors at the front side. Both the outer and inner sides of the drying chamber were covered with a 1.5 mm thickness stainless steel sheet. The drying chamber had four



layers of conveyor belts and was fitted with both ceramic infrared heater and electrical heaters. Sample discharged from the feed hopper to the top layer conveyor belt was conveyed along and transferred to the second layer, then to the third and fourth layer utilizing stainless-steel discharge fixed at the end of each layer. From the fourth layer, the dried sample could be discharged through the discharge chute.



Photograph of pilot-scale hot air assisted continuous infrared dryer

Development of Portable Fish Freshness Assessment Sensor Principal Investigator: Dr. George Ninan

Funding Agency: Ministry of Food Processing Industries (MoFPI)

Total Budget: 26.00 Lakhs

To identify and analyze the quality parameters describing the degree of freshness of fish

Various quality parameters indicating the fish quality and freshness were surveyed and identified that the K-value and TPC of fish against chilled storage follows a pattern. Hence, these parameters were identified as quality parameters describing the quality and freshness of fish.

Instrumental method to provide an objective system for determining fish freshness

A decrease in food quality gets reflected in the color, shape, and size of the products and color change were evaluated using an image processing techniques. The proposed system was portable, non-destructive, and rapid.

A prototype of the proposed fish freshness sensor was assembled with an LCD unit, power source, camera module, Raspberry pi armour case, and a dual fan. The device was set to run on Raspbian OS. The freshness of fish was detected using the CNN model with the image segmentation method. Frameworks for designing CNN model with algorithm was done in MATLAB software. The eye image of specified fish was captured and the extend of spoilage with respect to the days after the catch of fish was intimated through the consumer-friendly interface by digital image processing tool.



Photograph of proposed portable fish freshness assessment sensor



5 Natural Levels of Formaldehyde in Freshly Harvested Finfish and Shellfish Species

Principal Investigator: Dr. George Ninan

Funding Agency: Food Safety and Standards Authority of India (FSSAI)

Total Budget: 54.00 Lakhs

Kinetics of absorption of added formaldehyde was carried out for Rohu and Indian Oil Sardine

Formaldehyde build-up during frozen storage was estimated for 15 species.

Method for simultaneous determination of TMAO, TMA and DMA by Ion Chromatography was developed.



Kinetics of formaldehyde absorption in Rohu (Labeo rohita)

FSSAI-National Reference Laboratory *Principal Investigator:* **Dr. C. N. Ravishankar**

Funding Agency: Food Safety and Standards Authority of India (FSSAI)

Total Budget: 25.00 Lakhs

LC-MS/MS based multiresidue method for detection of pesticide residue in fish and fish products was developed and submitted to FSSAI for approval as official method.

ICAR-CIFT received renewal of accreditation by NABL and FSSAI as per ISO 17025: 2017 under Integrated Assessment scheme fulfilling the requirements of FSSAI Reference Laboratory, for the period from 2022-2025.

FSSAI Manual for Fish and Fish Products was developed for testing all quality and safety parameters listed under section 2.6 of FSSR (Food Product Standards and Additive Regulation).



17 Network for Scientific Co-operation for Food Safety and Applied Nutrition (NetSCoFAN)

Principal Investigator: Dr. Satyen Kumar Panda

Funding Agency: Food Safety and Standards Authority of India (FSSAI)

Total Budget: 05.00 Lakhs

The FSSR requirements for 30 categories of fish and fish products were integrated in newly created webportal on Foodocoepia

Risk assessment on presence of chlorate in imported Basa and PAH in Masmin were initiated.

Two research projects submitted to FSSAI for funding support were evaluated in collaborative mode with partner institutes.

Development of a foldable smart live fish transportation system for distant trade of table fish

Principal Investigator: Dr. Parvathy U.

Funding Agency: Department of Science and Technology (DST)

Total Budget: Rs. 48.78 Lakhs

A modified version of automated pre-conditioning cooling system was designed with holding water being cooled by circulating it through aluminium coil kept in a cooling ice chamber. Automation of the cooling system was done for operating at different cooling rates as well as for various target water temperatures.

Studies on live transportation of marketable size GIFT was conducted. Pre-conditioning, transportation and revitalization studies were carried out and associated fish survival were assessed. Transportation was done in previously designed prototype and done for upto 24 hours followed by revitalization process. Conditions were refined so as to reduce the stress imparted on account of sudden pre-cooling. These studies on GIFT for six hours of short distance live transportation at 20°C and further post conditioning indicated a survival of about 86%.



Pre-conditioning of GIFT



Post-conditioning of GIFT



19

Determining seasonal and spatial occurrence of multiclass endocrine disrupting chemicals in the fishes, crustaceans and molluscs of the Vembanad urban estuary: risk assessment by an untargeted metabolomics approach

Principal Investigator: Dr. Niladri Sekhar Chatterjee

Funding Agency: Department of Science & Technology-Science and Engineering Research Board (DST-SERB)

Total Budget: 34.78 Lakhs

Multiresidue analytical method was developed for analysis of more than 130 contaminants and endocrine disruptors (EDCs) in fish from Vembanad estuary using gas chromatography and tandem mass spectrometry. Multiresidue analytical method developed for analysis of more than 150 contaminants and endocrine disruptors in fish using liquid chromatography and tandem mass spectrometry. Hazard index based risk assessment was carried out from the monitoring data and average contamination level was established. The assessment showed moderate risk from 2-phenyl phenol, metalaxyl, and poly aromatic hydrocarbons. Untargeted metabolomics workflow has been established in LC-Q-Orbitrap High resolution mass spectrometer.



Large scale multiresidue method developed for simultaneous analysis and quantification of more than 250 pesticides and endocrine disrupting compounds in fish using tandem mass spectrometry



20 Green, clean and affordable energy for fishermen Community: Development of a multipurpose solar thermal conversion system with gasifier/biomass heater backup

Principal Investigator: Dr. Murali S.

Funding Agency: Department of Science & Technology (DST)

Total Budget: 24.71 Lakhs

Performance evaluation of downdraft gasifier

To evaluate the biomass (coconut shell) consumption, specific gasification rate, producer gas yield, specific gas production rate, and efficiency of the downdraft gasifier system were monitored. The results indicated that about 10 kg of coconut shell was required hourly to continue the drying process. The ease of operation and cost of a backup system was lower for the biomass water heater compared to the gasifier.



The gasifier system under operation

Design of the multipurpose solar thermal conversion system and site selection

Design calculations were made for a multipurpose solar thermal conversion system having the facility for drying fish of 50 kg capacity, hot water generation (about 300 LPD), and solar photovoltaic system (1 kW). The drying chamber dimensions were calculated as $2 \text{ m} \times 1.2 \text{ m} \times 1.7 \text{ m}$. Shri. P. Rajeev., Hon. Minister of Industries and Law, GoK, declared the site for installation of multipurpose solar thermal conversion system and launched the DST funded CIFT project at Pizhala, Ernakulam on 3^{rd} July 2021.



SOLAR HYBRID DRYER WITH BIOMASS WATER HEATER BACKUP



21 Improved Coconut Wood Canoes for Small Scale Fishing Sector of Southeast coast of India

Principal Investigator: Dr. Leela Edwin

Funding Agency: Coconut Development Board (CDB)

Total Budget: 34.72 Lakh

Assessment the ecotoxicity of biocides used for preservation of coconut wood in the aquatic environment.

Scanning electron microscope (SEM) images of coconut wood samples treated with 8% Copper Chrome Boron (CCB), 0.02% nano copper oxide and 0.02% nano copper oxide with polyaniline before exposure indicated strong interaction of copper compounds with wood.



SEM images of untreated and treated coconut wood samples

Samples were exposed in marine condition for a period of 360 days. CCB treated coconut wood samples showed comparatively lower rates of degradation. Better flexural properties were observed for CCB treated wood.

The fouling and boring activity on different biocide treated coconut wood samples exposed in the marine environment was evaluated. The fouling and boring community encountered during the exposure comprised of barnacles, mussels, bryozoans, sea anemone, flatworms oysters and isopods. Visual observation of exposed wood samples revealed that CCB treated samples retained mechanical strength after the exposure period.



Organisms found on exposed wood samples



Construction and performance evaluation of coconut wood canoe for traditional fisher

Constructed and handed over a coconut wood canoe (8 m LOA -) to the South Asian Fisherman Fraternity (SAFF), Colachel, Tamil Nadu for performance evaluation. Based on feedback from the fishermen operating the canoe, modifications/changes were made.



Handing over the newly constructed canoe to the SAFF, Colachel, Tamil Nadu

National surveillance programme for aquatic animal diseases

Principal Investigator: Dr. Murugadas V.

Funding Agency: Pradhan Mantri Matsya Sampada Yojana (PMMSY), Dept. of Fisheries, Govt. of India

Total Budget: 102.00 Lakhs

22

Collection of baseline data and active disease surveillance was carried out in 25 brackish water shrimp farms and 9 finfish farms. Under active surveillance of shrimp farms, 7 farms were *Enterocytozoon hepatopenaei* (EHP) positive. Under active surveillance of finfish, 2 finfish farms were tested Epizootic Ulcerative Syndrome (EUS) positive. Five passive disease surveillance (3 shellfish farms and 2 finfish farms) were carried out. Under passive surveillance, 2 shrimp farms from Thrissur district were tested EHP positive and 1 finfish farm was tested EUS positive.



EUS: Amplicon size - 550bp. with positive, negative control and marker 100bp



EHP: Amplicon size-176bp nested product. with positive and negative controls, marker 100bp

Externally Funded Projects



23 Screening lytic phages from diverse marine and aquatic niche for controlling bacterial pathogens associated with aquaculture and post-harvest fish quality

Principal Investigator: Dr. B. Madhusudana Rao

Funding Agency: Department of Biotechnology (DBT)

Total Budget: 60.12 Lakhs

Isolation and genome sequencing of coliphages: Coliphages with lytic activity against antibiotic resistant *E.coli* and vibriophage with lytic activity against luminescent *Vibrio* sp. were isolated, purified and enriched. These bacteriophages were found to be promising alternatives for the biocontrol of AMR *E.coli* and luminescent *vibrios*. Whole Genome Sequencing (WGS) of three coliphages (Coliphage EC-S- ϕ 21, Coliphage EC- ϕ 24; Coliphage-EC- ϕ 11) and one Vibriophage- ϕ LV6 was completed and the sequences were deposited to NCBI with SRA accessions SRX10656486, SRX10680464, SRX11714574 and SRX11723867.

In-vitro activities of bacteriophages: A phage cocktail was prepared with 10 individual coliphages with best host range and diverse location. The phage cocktail was found to be effective *in vitro*, in inhibiting the growth of multidrug resistant *E. coli*.



Very high loads of luminescent bacteria in water from bacteria control tank compared to water from vibriophage treated tanks



Lytic activity of Coliphage cocktail against AMR E.coli at different concentrations



24 Validation and dissemination of Ocean state forcast advisories along Gujarat Coast *Principal Investigator:* Dr. V. B. Madhu

Funding Agency: ESSO-INCOIS (Indian National Centre for Ocean Information Services)

Total Budget: 26.07 Lakhs

A distribution model for the abundance of jellyfish along Gujarat coast was developed using maximum entropy modelling.

A jellyfish cooccurrence model was developed based on the catch details from commercial trawlers operating along Gujarat coast.

The distribution of jellyfish abundance along the Gujarat coast was predicted by the results of maximum entropy modelling. Though jellyfish can be found all along the coast, the largest abundance was found up to a depth of 100 metres off the coast. Near the coast and to the north of the Veraval shore, there is a greater abundance. Among the different environmental parameters considered, the highest percentage contribution to the total prediction in decreasing order is by chlorophyll (43.4%), Temperature (31.74%) and salinity (10.82%).



Externally Funded Projects



25

Marine fishery in Kerala- A study on evolution of policy, cost and earnings of fishing units and income of fisher households

Principal Investigator: Dr. Suresh A.

Funding Agency: State Planning Board, Kerala

Total Budget: 61.40 Lakhs

The desktop survey on the evolution of fishery policy in Kerala in a political economy context showed that the evolution of marine fishery policy in Kerala is closely linked with mechanisation in fishing sector, capital infusion, livelihood issues of artisanal fishers, unhealthy competition for resources, depletion of several commercially important species and widening and deepening export markets. The overall situation shows tendency towards overfishing, both in biological and economic terms. The trawl technology, which targeted shrimp has emerged as the major fishing method targeting finfishes too. Widespread mechanisation of the fishing vessels with powerful engines and larger gear has generated unhealthy competition in the seas. The distributive impact of the development has been glaring: conflicts between trawl fishers and artisanal fishes have emerged. The common property nature of marine fishery accentuated the situation. This has generated governance issues as well. Further, the interlocked nature of credit delivery for fishing and fish marketing system has favoured intermediaries in appropriating much share in the value chain. There were calls for introduction of various management strategies to address the issue, including marine spatial planning. However, the inherent volatility in catch value, competition in an open access system, and the significant sunk costs involved in mechanized fishing forces sustainability as an agenda to the backseat and impede the initiation of any voluntary restriction in the sector. Seasonal fishing ban (SFB) was introduced to ameliorate the unsustainability issues in the ecological, economic and social sectors in fisheries. But, over years, there are disputes on the efficacy of SFB in protecting the interest of the fishing community in general and artisanal fishers in particular.

The international regulations in term of Code of Conduct of Responsible Fishery (CCRF) of FAO and norms of WTO to reduce subsidy have also impacted the policy development. The review has identified several factors including technology, polity and institutions that affect the fishery policy and fishing activities. The strong linkage of fishery to external economy through trade, maritime regulations, common property nature of fisheries and common and differentiated concerns of fishermen are additional factors that influence policy development. A framework that incorporates all these dimensions are critical in understanding policy which can guide technology, investment and governance in fisheries.

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COLLABORATION WITH OTHER INSTITUTES

International Institutions

- Borlaug Institute for South Asia (BISA)
- CODEX Alimentarius Commission, Rome
- Food and Agriculture organization (FAO), Rome
- Interdisciplinary Centre of Marine and Environmental Research (CIIMAR), University of Porto, Portugal.
- National Oceanic and Atmospheric Administration (NOAA), Washington, D.C., USA
- Norwegian University of Science and Technology (NTNU), Norway
- University of Arts London, UK
- University of Bradford, UK
- University of California (Irvine), US
- University of Cambridge, UK
- University of Edinburgh, UK
- University of Liverpool, UK
- University of Southompton, UK
- Whole Fried Chicken (WFC), Malayasia
- World Organisation for Animal Health (OIE)

National Institutes

- Assam University, Silchar, Assam
- Birla Institute of Technology and Science (BITS), Pilani
- Bureau of Indian Standards (BIS)
- C-CAMP, Bengaluru
- Central Institute of Fisheries Nautical and Engineering Training (CIFNET), Kochi
- Cochin Shipyard Limited (CSL), Cochin
- CSIR-Indian Institute of Toxicological Research
- Entrepreneurship Development Institute (EDII) of India, Ahmedabad
- Export Inspection Agency (EIA), Veraval and Porbandar
- Export Inspection Council (EIC), New Delhi
- Fishery Survey of India (FSI), Kochi
- Food Safety and Standards Authority of India (FSSAI), New Delhi
- Guwahati Medical College and Hospital, Guwahati



- ICAR- Central Institute of Temperate Horticulture, Lucknow
- ICAR- Indian Veterinary Research Institute (IVRI), Izatnagar, UP
- ICAR- National Dairy Research Institute (NDRI), Karnal
- ICAR- National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI), Bengaluru
- ICAR Research Complex for NEH Region, Meghalaya
- ICAR- RC for NEH, Umaim
- ICAR-Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar
- ICAR-Central Institute of Fisheries Education (CIFE), Mumbai
- ICAR-Central Marine Fisheries Research Institute (CMFRI), Kochi
- ICAR-Central Marine Fisheries Research Institute (CMFRI), Veraval
- ICAR-Indian Agricultural Research Institute (IARI)
- ICAR-National Research Centre for Grapes
- ICAR-National Rice Research Institute (NRRI,CRRI), Cuttack
- Indian Institute of Technology (IIT), Delhi
- Indian National Center for Ocean Information Services (INCOIS), Hyderabad
- Indian Institute of Science (IISc), Bangalore
- Indian Institute of Technology (IIT), Madras
- Indian Institute of Technology, Gandhinagar
- Krishi Vigyan Kendra (KVK), Lakshadweep (for Swachhta Action Plan)
- Krishi Vigyan Kendra, Kumarakom, Kerala
- Marine Products Export Development Authority (MPEDA), Kochi
- Marine Products Export Development Authority, (MPEDA) Veraval, Porbandar and Ahmedabad.
- National Fisheries Development Board (NFDB), Hyderabad
- National Institute of Fisheries Post Harvest Technology and Training (NIPHATT), Kochi
- Network for Fish Quality Management and Sustainable Fishing (NETFISH)-MPEDA
- National Institute of Food Technology, Entrepreneurship and Management (NIFTEM), TN
- National Bank for Agriculture and Rural Development (NABARD)
- Silchar Medical College, Silchar, Assam
- Udyabhansinhji Regional Institute of Cooperative Management, Gandhinagar



State Departments

- Agency for Development of Aquaculture Kerala (ADAK), Kerala
- Department of Fisheries, Diu
- Department of Forestry, Tamil Nadu
- District Youth Fishers Welfare Association, Visakhapatnam
- Kerala Antimicrobial Resistance State Action Plan (KARSAP)
- Kerala Pollution Control Board, Thiruvananthapuram
- Kerala State Coastal Area Development Corporation (KSCADC), Thiruvananthapuram
- Kerala State Co-Operative Federation For Fisheries Development Ltd. (Matsyafed), Kerala
- Society for Assistance to Fisherwomen (SAF), GoK
- State Fisheries Department, Gujarat and Uttarkhand
- State Fisheries Department, Kerala
- State Fisheries Department, Odisha
- State Fisheries Department, Puducherry
- State Fisheries Department, Tamil Nadu
- State Institute of Fisheries Technology, Kakinada

Universities/ Colleges

- Andhra University, Visakhapatnam
- Annamalai University, Chidambaram, Tamil Nadu
- Assam Agriculture University (AAU), Johat, Assam
- Azim Premji University, Bangalore
- Birsa Agricultural University (BAU), Ranchi, Jharkhand
- Central Agricultural University (CAU), Imphal, Manipur
- Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh
- Christ College, Rajkot, Gujarat
- Cochin University of Science and Technology (CUSAT), Kochi, Kerala
- College of Veterinary and Animal Sciences, Mannuthy, Thrissur
- College of Fisheries, NAU, Navsar, ,Gujarat
- College of Fisheries Science, Veraval
- College of Fisheries, Ratnagiri
- Dr.V.S. Krishna Govt. PG college GADVASU, Visakhapatnam, Andhra Pradesh
- Dr. Rajendra Prasad Central Agriculture University, Pusa, Bihar
- Gandhi Institute of Technology and Management (GITAM), Andhra Pradesh
- Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand



- Indira Gandhi Krishi Vishwavidyalaya (IGKV), Chhatisgarh
- Jawaharlal Nehru Krishi Vishwavidyalaya (JNKVV), Jabalpur, MP
- Junagadh Agricultural University, Junagadh, Gujarat
- Kamadhenu University, Gandhi Nagar, Gujarat
- Karnataka Veterinary, Animal and Fisheries Sciences University (KVAFSU), Bidar
- Kerala Agricultural University, Mannuthy, Kerala
- Kerala University of Fisheries and Ocean Studies (KUFOS), Panangad, Kerala
- Mahendra College of Engineering, Namakkal
- Odisha University of Agriculture & Technology (OUAT), Bhubaneswar, Odisha
- Postgraduate Institute of Fisheries Education and Research, Rajpur(Nava), Himmatnagar
- Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (SKUAST)
- Sri Venkateswara Veterinary University, Tirupati
- SRM Institute of Science and Technology, Chennai, Tamil Nadu
- Tamil Nadu Dr. J Jayalalithaa Fisheries University, Tamil Nadu
- University of Agricultural Sciences, Karnataka

Other Agencies

- Haritha Farmer's Club, Perumbalam, Alappuzha
- Indian Coast Guard, Veraval and Porbandar
- M/s. Anandi, NGO, Ahmedabad, Gujarat
- M/s. Sagar Manthan Machhimar Utthan Mandal, Veraval
- Snehakuja Trust, Kasarkod, Honnavar
- World Wildlife Fund (WWF), India

Private Sector

- All Kerala Trawl Fishermen Association, Kollam, Fishermen Societies
- Amalgam Foods Pvt. Ltd.
- Amar Aquatic Products, Gujarat
- Amar Polyfils Private Limited, Gujarat
- AVT Naturals



- Boat owners association, Veraval
- Bodina Naturals Pvt. Ltd., Kochi
- Capt Steel Eqpt. & Furniture, Ernakulam
- Chiranjeevi Processors, Coimbatore
- Chiranjeevi Processors, Tamil Nadu
- Cochin Food Tech Pvt. Ltd., Cochin
- Dellmarc, Thrissur
- DRP Molecules Pvt. Ltd., Ernakulam
- Dupont, India
- Fish Processing Establishments, Kerala
- GermKill India Labs LLP, Bangalore,
- Golden Catering Eqt., Vizag
- Grynd Fresh Pvt. Ltd., Kochi
- Hindalco Industries Limited
- ICICI Foundation, Guwahati
- Ideal Trading Company, Kollam
- Ishka Renewable Farms Pvt. Ltd.
- Izzie Food Industry, Ernakulam
- Katla Fisheries, Kochi
- Kerala store, Bhopal
- Kraftwork Solar, Ernakulam
- Linga chemicals, Tamil Nadu
- M/s. Amar Aquatic, Porbandar
- M/s. Athos Collagen, Gujarat
- M/s. Athos Collagen, Mangrol, Gujarat
- M/s. DeepMala Foods, Veraval M/s Germkill India Labs LLP, Bangalore
- M/s Katla Seafoods, Kaloor
- M/s KEIND Marine Products LLP, Kochi
- M/s Meck Pharmaceuticals & Chemicals Pvt. Ltd., Ahmedabad
- M/s Navalt Solar & Electric Boats Private Limited, Kochi



- M/S Nishiindo foods Pvt. Ltd. Veraval
- M/s One India Farms and Plantation, Kalamassery
- M/s Prime Harvest, Chellanam
- M/s. Real Exports, Veraval
- M/s Samudra Shipyard Pvt. Ltd., Aroor
- M/s Sixth Taste Food products, Kochi
- M/s Srivatsav Enterprise, Visakhapatnam
- M/s. Sail Ganga EU Exports, Veraval
- M/s. Vanita Cold Storage, Veraval
- Meck Pharmaceuticals & Chemicals Pvt. Ltd. Gujarath
- MSSRF, Chennai (Cochin Branch)
- Parayil Farms, Ernakulam
- Phytozyme Biotechnology, Pollachi
- Quest Bio Organics, Kolkata
- Seafood Exporters Association of India (SEAI)
- Sixth Taste foods, Thoppumbady
- Team Sustain Limited, Cochin

Extension and Development Agencies

- Bay of Bengal Programme (BOBP), Tamil Nadu
- National Institute of Agricultural Extension Management (MANAGE), Hyderabad



Commercialization of Technologies

SN.	Technology	Date of Agreement signing	Name of the Client	Total Budget
1	Technical know-how of Solar-LPG Hybrid Dryer (100 kg capacity) and training for dry fish processing	12.01.2021	M/s Source factory, Aluva	Rs. 5000/- + 18% GST
2	Technical support and guidance for microbiological analysis of seafoods.	19.01.2021	M/s Nishiindo Foods Private Limited, Veraval	Rs.10,000/- + 18% GST
3	Production of hydroxyapatite	12.02.2021	M/s. ANDR, Karnataka	Rs.2,00,000/- + 18% GST
4	Technical know-how of dry fish, dried shrimp, and low salt dried fish products.	05.04.2021	M/s Srivatsav Enterprise, Visakhapatnam	Rs. 5000/- + 18% GST
5	Technical know-how of hygienic fresh fish handling, cleaning and its packaging	09.07.2021	M/s One India Farms and Plantations Pvt. Ltd., Ernakulam	Rs. 10,000+18% GST
6	Technical know-how of fish fingers	30.07.2021	Mrs. Sreelekha Boban, Calicut	Rs. 5,000+18% GST
7	Technical know-how of production of fish/shrimp feed from fishery waste/ by products	30.07.2021	Mr. Fazil Backer P.A., Ernakulam	Rs. 25,000+18% GST
8	Technical know-how for marination of fish	09.08.2021	Mr. Jishnu Sasidharan, Malappuram	Rs. 15,000 + 18% GST
9	Production of fish/ shrimp feed and other products by utilizing fish processing discards	24.08.2021	Kerala State Cooperative Federation for Fisheries Development Ltd. (Matsyafed), Trivandrum	Rs. 1,00,000 + 18% GST
10	Technical know- how for the production of mince- based products	28.08.2021	M/s Sagar Manthan Machhimar Utthan Mandal, Veraval	Rs. 10,000 + 18% GST
11	Preparation of paraben free seaweed extract and collagen peptide incorporated face mask	28.08.2021	M/s Amar Aquatic, Porbander	Rs. 25,000 + 18% GST
12	Technical know- how for the production of value- added products	28.08.2021	Fisheries Department, Uttarakhand	Rs. 25,000 + 18% GST
13	Technical know-how for the production of fish and chicken sausages.	08.09.2021	M/s Sixth Taste Food products, Kochi	Rs. 25000 + 18% GST



14	Process optimization for the production of RTE roasted coconut pastes for squid, crab, prawn, sambar, chicken and meat.	13.09.2021	Grynd Fresh Pvt. Ltd., Kochi	Rs. 25000 + 18% GST
15	Technology transfer of growth enhancer and spray dried feed supplements from shrimp shell waste.	15.09.2021	Quest Bio Organics, Kolkata	Rs. 3,00,000 + 18% GST
16	Technical know-how for tuna salad	17.09.2021	M/s KEIND Marine Products LLP, Kochi	Rs. 25000 + 18% GST
17	Technical know- how of Hygienic fresh fish handling, cleaning and packaging	28.09.2021	M/s Prime Harvest, Kochi	Rs. 10,000 + 18% GST
18	Technical know- how for conversion of fish waste into manure	05.10.2021	M/s Katla Seafoods, Kaloor	5 th October, 2021
19	Technical know- how of hygienic fresh fish handling, cleaning, packaging, dry fish, fish pickle, masala coated, and chutney powder.	11.10.2021	Kerala Store, Bhopal	Rs. 8000/- + 18% GST
20	Technical Know- how of Hygienic fresh fish handling, cleaning and its packaging.	22.10.2021	Ideal Trading Company, Kollam	Rs. 5000 + 18% GST
21	Technical know- how of Hygienic fresh fish handling, cleaning and packaging and production of fish/ shrimp pickle.	11.11.2021	Izzie Food Industry, Ernakulam	Rs. 15,000 + 18% GST
22	Technical know-how, Process protocols and Product profile for foliar spray utilizing fish waste and chitosan.	24.11.2021	Linga chemicals, Tamil Nadu	Rs. 20,000/- + 18% GST
23	Technical know- how for Medium Viscosity Chitosan	08.12.2021	Chiranjeevi Processors, Tamil Nadu	Rs. 50,000 + 18% GST
25	Technical know- how for production of medium viscosity chitosan (500 cP around)	27.12.2021	M/s Meck Pharmaceuticals & Chemicals Pvt. Ltd., Ahmedabad	Rs. 1,00,000 + 18% GST
25	Technical know- how of manufacture of Insulated Fish bag	27.12.2021	Mr. Pentapalli Rambabu, Visakhapatnam	Rs.5,000/- + 18% GST
26	Technical know- how and standardization of Five fish curries- Prawn Mango curry, Anchovy Peera, Malabar Koonthal Varatiyathu, Kallumekaya Roast, Karimeen Masala	30.12.2021	Kerala state Coastal Area Development Corporation (KSCADC), Thiruvananthapuram	Rs. 1,00,000 + 18% GST



Tec	Technology Transfer through Empanelled Agencies				
1	Solar electrical dryer (20 kg) – 5 units	30.3.2021	District Manager, Matsyafed, Kottayam	Rs. 7,50,000/- + GST	
2	Solar electrical dryer (40 kg) – 1unit	1.9.2021	Mr. Binoj, Kalady, Ernakulam	Rs. 2,80,000/- + GST	
3	Solar electrical dryer (20 kg) – 1 unit	2.9.2021	Olive Theological Institute, Thiruvalla	Rs. 1,50,000/- + GST	
4	Solar electrical dryer (20 kg) – 1 unit	5.10.2021	Sri. Teja Narasinga Rao	Rs. 1,50,000/- + GST	
5	Refrigerated mobile fish vending kiosk – 14 units	15.9.2021	Activity groups under SAF, Kerala	Rs. 9,80,000/- + GST	
6	Value added fish product development units	07.12.2021	KVK Karaikal	Rs. 100000/-	
7	Value added fish product development units	08.12.2021	KVK Puducherry	Rs. 100000/-	
8	Value added fish product development units	06.12.2021	KVK-Tindivanam	Rs. 30000/-	
9	Value added fish product development units	03.12.2021	KVK Virudhachalam	Rs. 30000/-	
10	Value added fish product development units	06-12-2021	KVK Myrada, Erode	Rs. 30000/-	
11	Value added fish product development units	06.12.2021	KVK – Ramanad, Ramanthapuram	Rs. 100000/-	
12	Value added fish product development units	23.11.2021	KVKSikkal, Nagapattinam	Rs. 100000/-	
13	Dissemination of improved fish drying	03.09.2021	PKKVK Puducherry	Rs. 70000/-	
14	Dissemination of improved fish drying	02.08.2021	KVK Karaikal	Rs. 70000/-	





Inauguration of the new dry fish venture at Kalady, Ernakulam under the technical guidance of ICAR-CIFT



Handing over of refrigerated fish vending kiosk to Mrs. Lini, Flowers Activity Group, Kumbalanghi by the Honourable Secretary, Fisheries, Gol in presence of Director and officials of CSL and CIFT



Contract Research (Collaborative / Grant-in-Aid / Sponsored)

SN.	Technology	Date of Agreement signing	Name of the Client	Total Budget
1	Distribution of Refrigerated Mobile Fish Vending Kiosks for Fisherwomen	03.03.2021	Tripartite Agreement 1)Cochin Shipyard Ltd., 2) ICAR-CIFT, 3)SAF	Rs. 20,06,800/- (inclusive of GST)
2	Performance validation and NABL Accreditation of Assurance® GDS system for detection of food pathogen in fish and seafood	01.04.2021	M/s. Merck Life Science Private Limited	-
3	Establishment of IRMS facility for Food Authentication	15.06.2021	Thermo Fisher Scientific India Pvt. Ltd.	-
4	Using Radio Frequency Identification Technology to mark fishing gear in Lakshadweep's drift gillnet fishery	30.10.2021	World Wide Fund for Nature- India, New Delhi	Rs. 3,00,664/- (inclusive of GST)
5	Collaborative Research: Extraction, characterization and clinical evaluation of biomolecules of aquatic origin	21.01.2022	Pushpagiri Medical Society (PMS)	-



Consultancy

SN.	Technology	Date of Agreement signing	Name of the Client	Total Budget
1	Design of 21.0 m LoA steel Long liner cum Gillnetter	17.02.2021	Sadhav Offshore Engineering Company, Mumbai	Rs. 1,15,000+ 18% GST
2	Consultancy assignment for Aquatic Animal Health Centre	16.09.2021	Tripartite agreement between ICAR-CIFT, ADAK, Dept. of Fisheries (Kerala)	Rs. 4,23,729 + 18% GST
3	Providing technical support and guidance for the upgradation of microbiological laboratory	28.08.2021	Real Exports, Gujarat	Rs. 25,000 + 18% GST
4	Providing technical support and guidance for the upgradation of microbiological laboratory	28.08.2021	Deep Mala Foods, Gujarat	Rs. 25,000 + 18% GST
5	Up-gradation of microbiological laboratory	28.08.2021	Sail Ganga EU Exports, Veraval,	Rs. 25,000+ 18%GST
6	Up-gradation of microbiological laboratory	28.08.2021	Vanita Cold Storage, Veraval,	Rs. 25,000+ 18%GST
7	Thermal optimization of collagen extracted from fish scale	28.08.2021	Athos Collagen, Surat, Gujarat	Rs. 50,000+ 18%GST
8	Technical support and guidance for microbiological analysis of fish and fishery products	28.08.2021	Amar Aquatic, Porbandar	Rs. 50,000+ 18%GST
9	Design and evaluation of stability booklets	16.09.2021	Samudra Shipyard Pvt. Ltd., Aroor	Rs. 75,000 + 18% GST
10	Extraction of Protein isolates form chickpea and development of meat analogue	11.11.2021	Parayil Farms, Ernakulam	Rs. 35,000 + 18% GST
11	Witnessing the inclining experiment and approval of Trim and Stability booklets	03.12.2021	M/s Navalt Solar & Electric Boats Private Limited, Kochi	Rs. 18,000+ 18% GST



Contract service

SN.	Technology	Contract Service Period	Name of the Client	Total Budget
1	Contract service for microbial analysis of herbal products	01.01.2021	Naturalle Herbal Remedies Pvt Ltd, Nellore, Andhra Pradesh	Rs.92,500/-+ 18%GST
2	Extraction of collagen peptide from fish skin and bones.	01.06.2021 to 30.09.2021	Amar Polyfils Private Limited, Gujarat	Rs. 80,000 + 18% GST
3	Freeze-drying of mushroom based energy drinks	01.08.2021 to 30.09.2021	Mrs. Shije Varghese, Erammalur	Rs. 10,000 + 18% GST
4	Testing the efficacy of CITROBIOSHIELD, a multi-purpose, broad- spectrum, natural and organic antimicrobial	01.09.2021 to 31.03.2022	M/s Germkill India Labs LLP, Bangalore	Rs. 1,00,000+ 18% GST
5	PCR kit for detection of Tilapia Like Virus	01.10.2021	Agency for Development of Aquaculture, Kerala	Rs. 1,25,000 + 18% GST



First LNG Fishing Vessel in India

Energy use in the trawl sector

The fishing industry is heavily reliant on fossil fuels, which release large volumes of carbon dioxide and other greenhouse gases (GHGs). Out of 1,66,333 fishing vessels in the India's marine fisheries sector, 25.8 percent are mechanised, with trawlers accounting for 71.5 percent. India emits 134 million tonnes of CO2 (2.7%) from total marine capture fisheries for producing 90 million tonnes of fish (3.9% of global production), which is one of the most urgent issues in the fishing industries.

Liquified Natural Gas (LNG)

Natural gas, which is mostly methane, liquefies at approximately -160 degrees Celsius, reducing its volume to 1/600 that of its gaseous condition, making it more space efficient for storage and transportation onboard ships. There is extensive expertise with LNG utilization, namely with the use of boil-off gas in LNG carriers. Since 2000, other vessel types, such as ferries and offshore supply vessels, are also utilizing LNG as fuel. In India, using LNG in fishing vessels is a novel idea, both economically and in terms of safety. This offers up new opportunities for research in alternative fuels in the fishing industry where fuel prices account for more than 60%- 70% of overall operating costs.

A cryogenic tank made of chromium nickel stainless steel with a capacity to hold 450 litres of LNG was made. The initial substitution was made 30%- 40% (60%-70% HSD and 30%-40% LNG), and later the substitution could go up to 60% with LNG, depending on the performance.



Filling of LNG at the Jetty



The combined running time of HSD and LNG during the trials was 27.7 hours. A total of 592.5 litres of HSD were utilized during this period, while 220.0 litres of LNG was consumed. The average RPM during trawling operations was 1175, with average speed of 3.1 knots. The projected hourly use of fuel during trawling operations was 19.8 litres, whereas the concurrent consumption of LNG was 8.6 litres. The trials using LNG with a substitution of till 40% carried out onboard the Dept. Fishing trawler, showed encouraging results. There were no safety concerns, and no problem was detected during routine changeover procedures. No variations in power (where RPM taken as proxy), were observed in the initial trials when LNG was substituted up to 40% of the total quantity during our trials.

Based on the preliminary findings of the trials conducted it was concluded that LNG may be a viable choice for at least 40% substitution of HSD, thereby leading to the improvement of emission standards. While LNG can significantly reduce fuel prices (approximately 33% less than commercially available HSD), other factors should be considered when determining an LNG venture's economic viability.

Experimental trials of XtraGreen diesel developed by IOCL for the propulsion of fishing vessels and other applications

A consultancy MoA was signed for the joint test on evaluation of XtraGreen Diesel Fuel on Fishing Vessel (F.V. Sagar Harita) between ICAR-CIFT and Indian Oil Corporation Limited.

The first of its kind of experimental fishing trials were conducted in the main engine of F.V.Sagar Harita the research vessel of CIFT, Cochin for using the XtraGreen diesel of IOCL for the propulsion of the vessel. There are more than 72000 mechanised fishing vessels operating in our country. The engine power of these vessels range from 10 hp to 600 hp. Among this approximately 35000 are trawlers and 20000 are gillnetters which conduct multiday fishing. Nearly 1000 long liners also conduct multiday long lining for fish catching. Very large quantity of diesel is being burnt by these multiday fishing vessels. The daily fishing vessels also burn diesel from 80 to 150 liters. This leads to high carbon emission to the atmosphere. Hence the significance of the study in the application of alternate fuel in the fishing industry



F.V.Sagar Harita: Research Vessel of ICAR-CIFT used for experiment



Exhaust gas monitoring system

Fuel consumption meter

On 17th December 2021 IOCL developed XtraGreen diesel powered ICAR-CIFT research vessel F.V.Sagar Harita was flagged-off by Dr. C. N. Ravishankar, Director, ICAR-CIFT at Cochin which is to proactively kick-start the pilot scale studies on experimental fishing operations onboard this vessel at Cochin.





ANALYTICAL SERVICES

ICAR-CIFT is an accredited laboratory under the ISO 17025:2017. CIFT is a Referral Laboratory approved by the Food Safety Standards Authority of India (FSSAI), New Delhi. Analysing the fish and fishery product samples (biochemical and bacteriological quality, quality of packaging materials, gear materials etc.) from seafood processing industries and various institutes is the mandate of the institute. ICAR-CIFT laboratory is also recognised as a reference laboratory by FSSAI for addressing the legal samples received from different parts of the Nation. The details of samples analysed during the year and the revenue generated are given below:





Details of Samples Received (2021)

Revenue Generated in Rupees (2021)





Workshops/ Short Courses/ Seminars/ Conferences etc. Conducted

SI. No.	Title of the programme	No. of participants	Venue and date
1	Opportunities, Trends and Safety issues in seafood processing	100	26.02.2021 Online mode
2	Synthesis workshop, Dialogues in gender and coastal aquaculture: Gender and the seaweed farming value chain	12	05.03.2021 Online mode
3	ICAR-CIFT:ESSO-INCOIS Users-Interaction Workshop	20	09.03.2021 Porbandar, Gujarat
4	Hindi workshop: Official Language implementation and e-tools	22	20.03.2021 Online mode
5	ICAR-CIFT:ESSO-INCOIS Users-Interaction Workshop	20	24.03.2021 Okha, Gujarat
6	"Secondary Raw Material: A new Avenue in Fisheries Business"	100	10.07.2021 Online mode
7	Webinar on "Harvest and Post-harvest Technological Interventions for Environment Management for Sustainable Fisheries"	46	10.07.2021 Online mode
8	Webinar on "Value addition of farmed finfish and shellfish: Avenue for augmenting income from diversified aquaculture"	97	01.09.2021 Online mode
9	National webinar on 'System diversification in Aquaculture : Aquafeed from secondary fishery raw materials	52	01.09.2021 ICAR-CIFT, Cochin
10	National Webinar on "Bottleneck for seafood technologists in the microbiological examination of seafood"	100	28.09.2021 Online mode
11	Hindi workshop 'Linguistic Technology Toolkit'	22	30.09.2021 Online mode
12	Hindi Workshop for the scientific, technical and supporting staff of the centre through Google Meet platform.	12	12.10.2021 Online mode
13	National Campaign on AMR" on sub-theme "Antimicrobial resistance in fish" organized by ICAR-CIFT	170	23.11.2021 Online mode



14	Workshop cum sensitization programme on Carbon dioxide refrigeration systems in India conducted as part of Future Refrigeration India: INDEE+ (Indo Norwegian project)	20	29.11.2021 – 30.11.2021 ICAR-CIFT, Cochin
15	Webinar on "Women work in Fisheries, Too!", in collaboration with SOFTI, GAFS of AFS, USAID RDMA CTI-CFF	53	29.11.2021 Online mode
16	Technology Clinic on Fish Processing and Value addition	30	21.12.2021 – 22.12.2021 ICAR-CIFT, Cochin
17	Dissemination workshop under the 'ICAR-FAO collaborative project entitled Support mitigation of Antimicrobial Resistance (AMR) risk associated with aquaculture in Asia'	90	21.21.2021 State Institute of Fisheries Technology, Kakinada
18	Dissemination programme under the 'ICAR-FAO collaborative project entitled Support mitigation of Antimicrobial Resistance (AMR) risk associated with aquaculture in Asia'	60	29.12.2021 College of Fishery Science, Muthukur,



Workshop cum sensitization programme on 'Future Refrigeration India' held at ICAR-CIFT, Cochin





Participants of Users-Interaction workshop conducted by ICAR-CIFT and ESSO-INCOIS







સુરજકરાડી ભાસ્કર :આઇસીએઆર સીઆઇએફટી એસો ઇનકોઇસ દ્વારા માછીમારોની ક્રિયાપ્રતિક્રિયા કાર્યશાળાનું મત્સ્યોદ્યોગ વિભાગ ગુજરાત સરકારના સહયોગથી તા. 24ના કરવામાં આવ્યું હતું. કાર્યક્રમમાં પ્રજીત કે.કે., એ આઇસીએઆર સીઆઇએફટી અને ઇનકોઇસ દ્વારા પ્રદાન કરવામાં આવતી ટેકનોલોજીઓ અને સેવાઓ અંગે માછીમારી સમુદાયને વકતવ્ય આપ્યું હતું. ઓખાને લક્ષિત જેલીફિશ માછીમારીના વિવિધ પાસાઓની ચર્ચા કરાઇ તથા સલામત માછીમારી અંગેનું બ્રોશર કાર્ય દરમિયાન બહાર પડાયું હતું. કાર્યશાળામાં ઓખાના 20 માછીમારો જોડાયા હતાં અને જે.બી. બારડ, ડી.એમ. મકવાણા, આનંદ નારાયણ ડી. સહિતના ઉપસ્થિત રહયા હતાં. Press release of Participants of Users-Interaction workshop conducted by ICAR-CIFT and ESSO-INCOIS



Trainings / Awareness Imparted

SI. No.	Subject	No. of beneficiaries	Venue and date
1	Online Training of Master Trainers (ToMT) on Fish and Marine Products Processing "Quality assessment of fishery products: Notified NARL labs. Referral Labs	300	07.01.2021
	and Reference Labs in India for fishery products".		Online mode
2	Online training programme conducted through Virtual platform under PMMSY topic "Hygienical method of drying fishes and shrimps using ICAR-CIFT solar cum electric backup drier (10Kg drying capacity)"	183	19.01.2021 KVK– Sikkal, Nagapattinam
3	Online training programme in association with NFDB under PMMSY-ICAR-DoF convergence on 'Preparation of Value-added Fish Products for Boosting Fishpreneurship'.	635	19.01.2021 to 20.01.2021 Online mode
4	Improved Techniques of Fish Processing and Entrepreneurship Development	3	20.01.2021 to 27.02.2021 ICAR-CIFT Kochi
5	Online training programmes on "Sustainable business opportunities in harvest and post harvest fisheries" Under PMMSY with ICAR-DoF convergence	150	24.01.2021 Online mode
6	Online training programmein association with NFDB under PMMSY-ICAR-DoFconvergence on 'Improved techniques of production of value added fish products'.	548	2.02.2021 Online mode
7	"Improved techniques of fish processing and entrepreneurship development" for three participants from Ladakh and J&K region under Naropa Fellowship programme.	3	25.01.2021 to 28.02.2021
8	Online Training programme in association with NFDB under PMMSY-ICAR-DoF convergenceon 'Improved Fishing Crafts and gears'.	571	05.02.2021 to 06.02.2021 Online mode
9	Safety of responsible fishers at sea	1249	09.02.2021 Online Mode
10	Under WWF-CIFT collaborative research programme, field trials of shark by catch reduction devices	5	10.02.2021 to 11.02.2021 Off Okha and Jakhau
11	Fishing Gear regulations in Kerala and demonstration of Gear testing	32	16.02.2021 to 17.02.2021 Online Mode
12	"Development of value-added extruded fish products	40	23.02.2021 Online Mode



13	Production of high value secondary product from fish waste	36	25.02.2021 Online Mode
14	Pre-processing and Drying of Fish	21	26.02.2021 to 27.02.2021 ICAR-CIFT Kochi
15	Hygenic handling and improved techniques for production of value added products from seafoods	20	27.02.2021 Veraval RC of ICAR- CIFT
16	Training programme on 'Improved techniques of fish processing and entrepreneurship development' for the participants from Ladakh and J&K region under Naropa Fellowship programme	22	27.01.2021 to 28.02.2021 ICAR-CIFT, Kochi
17	Pre-processing and drying of fish	21	26.02.2021 to 27.02.2021 ICAR-CIFT Kochi
18	Improved fish drying technology	32	01.03.2021 to 02.03.2021 Online Mode
19	Refrigerated fish vending kiosk	28	03.03.2021 ICAR-CIFT, Kochi
20	Development of shrimp-basedvalue-added products	46	04.03.2021 to 05.03.2021 Online Mode
21	Hygienic handling & Livelihood opportunities through producing value added products from seafood"	20	05.03.2021 to 06.03.2021 Veraval RC of CIFT
22	NEH programme on "Training cum demonstration on skill development on value added fishery products and entrepreneurship promotion" in collaboration with College of Fisheries, Lembucherra, Agartala, Tripura.	50	10.03.2021 to 19.03.2021
23	Hygienic handling & Livelihood opportunities through producing value added products from seafood	20	10.03.2021 to 11.03.2021 Ranchi, Jharkhand
24	Novel fish drying techniques and preservations	56	12.03.2021 Online Mode
25	One week training to Mr. Jaffar Sadiq, SMS, KVK Lakshadweep on fish waste utilisation for preparation	1	15.03.2021 to 21.03.2021
	or reed and manure		
26	'Fishing Technological interventions for inland fisheries'	25	16.03.2021 to 18.03.2021
20	under NEH programme	20	College of Fisheries, Agartala



27	"Skill development on value added fish products and entrepreneurship promotion" under NEH programme	25	16.03.2021 to 18.03.2021 College of Fisheries, Agartala
28	Fishing gear materials: Identification and properties	12	17.03.2021 Online Mode
29	Phenotypic and Molecular methods for detection of AMR' jointly organized by ICAR-NBFGR and ICAR- CIFT under the ICAR-FAO technical cooperation programme	52	17.03.2021 to 19.03.2021 Online Mode
30	Value addition of fish and fishery products	9	18.03.2021 to 20.03.2021 ICAR-CIFT Kochi
31	Training cum demonstration programme on "Value addition of fish and fishery products" under SCSP for SC Women group from peruvannamuzhy, Kozhikode, Kerala	9	18.03.2021 to 20.03.2021 ICAR-CIFT, Kochi
32	One day training on feed development from fish processing discards	10	20.03.2021 Online Mode
33	Online training programme in association with NFDB under PMMSY-ICAR-DoF convergence on 'Importance of HACCP and ISO 22000 in Seafood Processing & Quality Control'.	403	20.03.2021 Online Mode
34	Hygienic handling & Livelihood opportunities through producing value added products from seafood	20	22.03.2021 to 23.03.2021 Veraval RC of ICAR- CIFT
35	Value added mussels and fishery products	5	24.03.2021 to 25.03.2021 ICAR-CIFT Kochi
36	Online training program on "Value added fish products, byproducts, fish packaging and entrepreneurship opportunities" in collaboration with Ratnagiri Sub Campus, University of Mumbai, ICAR-CIFT, Kochi	49	04.05.2021 to 05.05.2021 Online mode
37	Pathogens in Seafood: Isolation and Identification (USFDA protocols)	10	11.06.2021 Online mode
38	Hands on training on Microbiological quality analysis of fish and fishery products	5	06.07.2021 to 11.07.2021 Veraval RC of ICAR- CIFT
39	One day training on feed development from fish processing discards	6	13.07.2021 Online Mode



40	A virtual meeting on stake holder based entrepreneurship development on "Opportunities in value addition of fish and fishery Products"	10	19.07.2021 Online
41	Panelist for panel discussion for UN Food Systems mini Virtual Consultation : "Adopt One Health approach to Prevent spread of antimicrobial resistance and unregulated use of antibiotics" organized by CII	~200	12.08.2021 (Online mode)
42	Imparted training to Mr. Vigneshkumar P N on Modern Analytical Techniques in Nutrient Composition and Chemical Residue Monitoring"	1	17.08.2021 to 17.12.2021
43	Hygienic dry fish production technology	60	23.08.2021 to 24.08.2021 (Online mode)
44	Training program on "Testing in Aquatic Animal Health Laboratory" for 5 staff of ADAK, Varkala, Kerala, Staff of ADAK, Govt. of Kerala	5	30.08.2021 to 03.09.2021 ICAR-CIFT, Kochi
45	Pre-processing and drying of fish	8	07.09.2021 to 08.09.2021 ICAR-CIFT Kochi
46	International training programme on Value chain management in fisheries (collaboration with CIFT and AARDO)	4	13.09.2021 to 16.09.2021 ICAR-CIFT Kochi
47	Training programme on HACCP Concepts	8	14.09.2021 to 17.09.2021
48	Refrigerated fish vending kiosk	28	15.09.2021 ICAR-CIFT, Kochi
49	Development of value added products from fish	12	16.09.2021 to 18.09.2021 Veraval RC of ICAR- CIFT
50	Post-harvest fisheries engineering	44	23.09.2021 to 04.10.2021 ICAR-CIFT, Kochi
51	Experimental Learning Programme on Post-harvest Fisheries Engineering	22	23.09.2021 to 28.09. 2021 ICAR-CIFT Kochi
			01.10.2021
	Training programme on 'Good Aquaculture Practices to		FRS of Sri
52	mitigate Antimicrobial Resistance (AMR) in freshwater	40	Venkateswara
	fish aquaculture'		Veterinary University (SVVU), Undi, Andhra Pradesh



52	Sensitization about compost making from house hold	50	13.10.2021
00	waste under Swachtha E sewa	50	Edavanakkadu
54	Processing and Value Addition of Fish and Shrimp 1		25.10.2021 to 29.10.2021 ICAR-CIFT Kochi
55	Recent Advances in Harvest and Post-Harvest Technologies in Fisheries (Online) Sponsored by ITEC	26	28.10.2021 to 10.11.2021 ICAR-CIFT, Kochi
56	Capacity building and skill development on fish processing technology	6	10.11.2021 to 11.11.2021 Veraval RC of ICAR- CIFT
57	Hygienic handling, Value addition and packaging of fish and fishery products	5	15.11.2021 to 17.11.2021 Veraval RC of ICAR- CIFT
58	Experimental Learning Programme on Post-harvest Fisheries Engineering	2	15.11.2021 to 18.11.2021 ICAR-CIFT Kochi
59	ITEC Training programme on 'Quality Assurance of Fish and Fishery Products'	20	16.11.2021 – 29.11.2021 Online mode
60	Development of fish based value-added products	25	22.11.2021 to 27.11.2021 ICAR-CIFT Kochi
61	Training cum demonstration programme topic on "Pre-processing and hygienically drying of fish and shellfishes using ICAR-CIFT Solar cum electric backup fish dryer"under ICAR-CIFT Scheduled caste sub plan programme (SCSP)	25	24.11.2021 KVK Madur, Karaikal
62	Training cum demonstration of DPA kit for the evaluation of antibiotic residues in aquaculture farm & its awareness	15	25.11.2021 Kodungallur, Thrissur
63	Training cum demonstration of DPA kit for the evaluation of antibiotic residues	10	26.11.2021 MPEDA, Kochi
64	Training cum demonstration of DPA kit for the evaluation of antibiotic residues in shrimp	03	29.11.2021 Baby Marine Exporters, Kochi
65	Training cum demonstration of DPA kit for the evaluation of antibiotic residues in aquaculture farm & its awareness	15	05.12.2021 Kodungallur, Thrissur



00	Training cum demonstration of DPA kit for the	10	06.12.2021
60	evaluation of antibiotic residues		MPEDA, Kochi
67	Training cum demonstration of DPA kit for the evaluation of antibiotic residues in shrimp	03	07.12.2021 Baby Marine Exporters, Kochi
68	Pre-processing and drying of fish	20	08.12.2021 to 09.12.2021 ICAR-CIFT, Kochi
69	Industrial training programme	5	08.12.2021 to 16.12.2021
70	Industrial Training program for B.E students of Mahendra Engineering College, Namakkal (Affiliated to Anna University, Tamil Nadu)	5	08.12.2021 to 16.12.2021 ICAR-CIFT, Kochi
71	Utilization of fish processing discards for the development of feed, silage, foliar spray and manure	5	10.12.2021 ICAR-CIFT Kochi
72	Three days training on fish waste utilization for feed, foliar spray and silage	40	13.12.2021 to 16.12.2021 Kavarathi, Lakshadweep
73	Livelihood based on fish value addition	34	14.12,2021 to 15.12.2020 Alleppey
74	Awareness campaign on compost making from household waste under Swach Bharath mission	10	20.12.2021 ICAR-CIFT, Kochi
75	Assessment for the role of aquatic animal health lab assistant (AGR/Q4911) conforming to national skills qualifications framework Level-4	9	ICAR-CIFT Kochi



Training programme on 'refrigerated fish vending kiosk'



Participants of Development of Value Added Products from Fish for Fish Farmers of Chamoli District, Uttarakhand





Training programme on pre-processing and drying of fish



Online Training programme in association with NFDB under PMMSY-ICAR-DoF convergenceon 'Improved Fishing Crafts and gears'.





Inaugural address by Director, ICAR-CIFT on Online training programme in association with NFDB under PMMSY-ICAR-DoF convergence on 'Improved techniques of production of value added fish products'

Welcome address by Dr. L.N. Murthy, SIC on Online training programme in association with NFDB under PMMSY-ICAR-DoF convergence on 'Importance of HACCP and ISO 22000 in Seafood Processing & Quality Control'.

DAPSC/SCSP Programmes

ICAR-CIFT successfully conducted 65 training/capacity building programmes, 12 frontline demonstrations and 5 awareness camps/workshops/exhibitions/exposure visits covering 21 states and 2 UTs of the Country under the DAPSC/SCSP programmes. Twenty other programmes including setting up of sales counters, provision of inputs such as dryers, nets, boats, pens, etc., setting up of dryers, Mini Fish Processing Units and custom hiring centres were also taken up during the period.



Training cum demonstration on battered and breaded fish products at KVK Ludhiana, Punjab

Training on fish mince and mince based products at KVK Jammu, Jammu



CIFT technologies including FRP canoes, fishing nets, solar dryers, fish smoking kilns, manual and motorized fish descaling machines, refrigeration enabled fish vending kiosks, insulated fish boxes, mini fish processing units, value-added fishery products were popularised among SC beneficiaries all over the Country.





Training programme on Fish processing and value addition at College of Fisheries, GADVASU, Ludhiana

Mini-fish processing units at KVK, Mohali, Punjab

For the successful conduct of DAPSC programmes and popularisation of CIFT technologies, ICAR-CIFT established linkages with 18 organisations including State Agricultural Universities and National Research Institutes.

Indicators	Number of Programmes	Number of Beneficiaries
Training / Capacity building	65	1625
Frontline demonstrations	12	600
Awareness camps/ Workshops/ Exhibitions/ Exposure visits	5	5000
Others (Distribution of inputs such as nets, boats, pens, etc.)	20	2000

Details of DAPSC/SCSP programmes conducted during January-December, 2021

These SCSP programmes were conceptualised and implemented by Dr. A.K. Mohanty, Nodal Officer, SCSP and Dr. Sajeev M.V., Co-Nodal Officer, SCSP, ICAR-CIFT, Cochin. The initiative taken in this regard by ICAR-CIFT could directly benefit nearly 9000 SC members all over the country during the year 2021.



Exhibitions organized

SI. No.	Name of the Exhibitions	Organizers	Date (Duration)
1	'Matsya Mela' at Payyannur, Kannur, Kerala	Aqua-Culture Development co-op Society (ADCOS)	13.01.2022 to 14.01.2022
2	Global Chemical Expo-2021	Indian Chamber of Commerce	20.07.2021 to 30.07.2021 (Virtual mode)
3	Food Tech India Virtual Expo-2021	Cruz Expos	24.08.2021 to 27.07.2021 (Virtual mode)
4	Seaweed India Expo	Smart Agri-post	26.08.2021 to 27.08.2021 (Virtual mode)
5	Organized the CIFT stall in the Exhibition "Vanija Utsav"	Department of commerce, UT of Lakshadweep and MPEDA	21.09.2021 to 22.09.2021
6	24 th National Agricultural Exhibition at Topsia, Kolkata	Central Kolkata Science & Cultural Organisation	28.10.2021 to 31.10.2021
7	World Fisheries Day, 2021 celebrations	National Fisheries Development Board, Bhubaneswar, Odisha	21.11.2021
8	National Fisheries Day at Bhubaneswar, Odisha	National Fisheries Development Board, Bhubaneswar, Odisha	21.11.2021
9	Agro and Cooperation Pre-Vibrant Gujarat Summit 2021	Agriculture, Farmers welfare and Co-operation department, Govt. of Gujarat	14.12.2021 to 16.12.2021
10	CHEMCON Exhibition-2021	Indian Institute of Chemical Engineers & Indian Chamber of Commerce	27.12.2021 to 30.12.2021 (Virtual mode)





Agro and Cooperation Pre-Vibrant Gujarat Summit 2021



ICAR-CIFT stall in the exhibition-World fisheries day, NFDB

Replies to Technical Queries



Receiving certificate of participation in the 24th National Agricultural exhibition, Kolkata

Technical queries received from the various categories of clients such as fish processors, technologists, entrepreneurs, self-help groups, Government organizations and fisherfolk were attended to. The queries were related to the topics such as harvest and post-harvest technology of fish, participation in training programme and payment of fees, technical guidance, analytical testing services, assistance under technology transfer programme etc. Some of the items are given below:

- Reply to FSSAI Codex Contact point on CCCF13
- Reply to BIS on affirmation of standards for standards adopted by BIS in FAD 12 and FAD 15
- Queries and visits by entrepreneurs and students on testing of samples and utilization of fish waste for development of fish feed and poultry feed were attended
- Attended press conference on the discussion of Swatchtha action plan activities of ICAR-CIFT.



Radio/TV Talks

SI. No	Name	Торіс	Broadcasted by	Date
	Dr. A. A. Zynudheen	Feed development from Market fish waste	All India Radio (AIR) Trivandrum.	06.11.2021
	Dr. Saly N. Thomas	Samudra Samrakshanam: Jeevanum Jeevanathinum' the Vayalum veedum in connection with the World Ocean Day	All India Radio (AIR), Trivandrum	08.04.2021
	Dr. M. V. Baiju	Radio talk on Marine Ambulance	All India Radio (AIR) Kochi FM (102.3 MHz)	13.09.2021
	Dr. Rehana Raj	Matsya samskaranavum moolya vardhitha Ulppanagalum	Atma Nirbhar Bharat Abhiyan (Vocal for local)	08.08.2021
	Dr. S. Monalisha Devi	Technologies of Fishing and fish processing' for the programme 'Science Magazine	All India Radio (AIR) Imphal	09.03.2021
	Dr. S. Monalisha Devi	PMMSY scheme	All India Radio (AIR) Imphal	18.04.2021
	'Sagaraperuma'	Krishideepam programme about CIFT	Asianet (https:// www.youtube.com/ watch?v=1swyYxyNO24)	20.03.2021 to 21.03.2021

Invited Talks

Dr. C.N.Ravishankar

Leadership - Experience sharing during MDP on Leadership Development (June 14-25, 2021) at NAARM on 19.06.2021

Advances in packaging during RAFTAAR Agripreneurship Development Program organised by KAU on 21.06.2021

Presentation on 'Business avenues in Fisheries' during the "National Dialog on Innovative Foods for Hospitality Industry" organized by ICAR on 22.06.2021

Inaugural address during the Training programme on Drying and Curing at Fisheries college, Jabalpur on 23.06.2021

Special address in the National Fish Farmers' Day-2021 organized by ICAR-CIFRI, Barrackpore, on 09.07.2021

Online talk under Bharat ka Amrut Mahotsav celebration at CIFE at 12.00 on 31.07.2021



Dr. Leela Edwin

Fishing gear regulations in KMFR with special reference to seines, In Training programme on Fishing gear regulations in Kerala under PMMSY on 16.02.2021

Environmental impacts of fishing and mitigation strategies In connection with 75th year of India's Independence as Bharat Ka Amrut Mahotsav on 10.07.2021

Fishing Craft and Gears of Indian Waters, Processing and Quality Assurance in fisheries for BFSc students of college of Fisheries, Dholi (RPCAU, Bihar) on 17.09.2021

Responsible fishing Importance and implementation strategies In ITEC training programme on Recent Advances in Harvest and Post-Harvest Technologies in Fisheries on 29.10.2021

Energy Use Optimization and Innovations in Fishing, XV Agricultural Science Congress on 15.11.2021

Dr. Suseela Mathew

Seaweed based functional foods business models from ICAR-CIFT, Cochin, In Entrepreneurship development through seaweed cultivation NCDC, Dept. of Fisheries on 28.01.2021

"Chitosan and Chitosan Derivatives in delivery systems of nutritionals and nutraceuticals", In 9th Indian chitin and chitosan society symposium (2012) by VNIT, Nagpur on 26.02.2021 to 28.02.2021

Dr. A. A. Zynudheen

Compliance of FSMS guidelines in fisheries sector organised by KUFOS in connection with world food safety day on 07.01.2021

Post-harvest fisheries engineering, viable options for fish waste management, In training on hygienic Drying of fish organized by Engineering Division of CIFT on 26.02.2021; 07.07.2021; 14.08.2021 & 08.12.2021

Fishery waste management, For Faculty members of VHSE on 03.03.2021

Fish feed from processing discards, In training programme to CAU, Imphal (Manipur) on 24.03.2021

Fish processing technology to students of NIFTEM, In training on hygienic Drying of fish organized by Engineering Division of ICAR-CIFT on 16.09.2021

Technological initiatives on development of feed from wet fish waste conducted by Forum of Industrial Fisheries Professionals on 20.11.2021

Dr. George Ninan

Processing and Value addition in the Seafood sector, In International training programme on Advanced Techniques in Fishing and Fish Processing sponsored by AARDO in virtual mode on 06.09.2021

Technologies for value addition of fish, In International training programme on Value chain management in fisheries sponsored by AARDO in virtual mode on 14.09.2021

Webinar on Making fish and fish products available as a health food throughout the year for the improvement of domestic consumption in NE Region, In Domestic Fish Consumption: Supporting Food and Nutritional Security in the North-Eastern states organized by NFDB and NIRD on 27.09.2021



World food day lecture, In World Food Day programme organized by Sree Buddha College of Engineering on 20.10.2021

Innovations and Options for Entrepreneurship in Fisheries Post-Harvest sector, Innovative Entrepreneurial Opportunities in Fisheries Sector organized by TNJFU –Fisheries Business School on 22.12.2021

Technology commercialization in the fisheries sector, Workshop on Cutting Edge Technologies in Fisheries and Aquaculture for Food and Nutritional Security (CETFAQ-2021) organized by PMFGR Centre, ICAR-NBFGR on 22.12.2021

Dr. Toms C. Joseph

Microbiological and Biotechnological Approaches to Seafood Safety, In P V Narsimha Rao Telangana Veterinary University College of Fishery Science, Pebbair on 25.03.2021

Effects of Aquaculture Probiotics: Overhyped or Real, In International webinar on Aquaculture probiotics organized by Envozyme Technologies Private Limited, Hyderabad on 25.09.2021

Strategies for the control of AMR in Aquaculture, In Department of Microbiology Savitribai Phule Pune University, Pune on 24.11.2021

Dr. T. V. Sankar

Fish as Business Avenue: Contributions from ICAR-CIFT, key note address in the 1st International Conference on Paradigm shift in global business ecosystem – Post COVID – 19 perspectives, at Holy Grace Academy of Management Studies, Mala held during 09.09.2021 to 11.09.2021

Designing Food Safety Management System, In the Indian Technical Economic Cooperation (ITEC) programme on Recent advances in harvest and post-harvest technologies in fisheries held during 28.10.2021 to 10.11.2021

Dr. Saly N. Thomas

Empowering women at the Women's day celebration, Muthoot Institute of Technology and Science at Muvattupuzha on 06.03.2021

Fishing gear materials & accessories Training programme on "Fishing gear materials: Identification & properties under PMMSY 17.03.2021

Recent trends in passive fishing techniques, ITEC training programme on Recent Advances in Harvest and Post-Harvest Technologies in Fisheries on 29.10.2021

Dr. M. P. Remesan

Sustainable fishing techniques for Inland Waters, In Improved Craft and Gears organised by Mumbai, RC of CIFT under PMMSY on 05.02.2021 to 06.02.2021

Resource and Energy Conservation in Fishing Gears, In ITEC training programme on Recent Advances in Harvest and Post-Harvest Technologies in Fisheries on 30.10.2021

Dr. Nikita Gopal

Fish Supply chain and management, In Online training of Master trainers on Fish and marine products processing under capacity building component of PM formalization of Micro food processing Enterprises (PM-FPE) Min. of Food processing, Gol org by ICAR-CIFT in collaboration with IIFPT, Thanjavur on 07.01.2021



Problem prioritization in fish marketing, E-trading on Livelihood promotion through pisciculture activities' under PMMSY, In Livelihood Promotion though pisciculture activities under PMMSY organized by National Institute of Rural Development and Panchayati Raj, Hyderabad on 13.07.2021

Gender, Nutrition & Fish, In International Virtual Consultation on Ensuring Food and Nutrition Security in the context of Climate Change and Covid-19 held at MSSRF, Chennai on 06.08.2021 to 10.08.2021

Mainstreaming social science research in in fisheries and aquaculture – shifting to trans-disciplinary approaches, In Panelist at the Social Scientist Assembly on The Importance of Social Science Research in Fisheries and Aquaculture: at the Sixth Joint International Conference for Fisheries and Aquatic Sciences (ICFAS6) and Asian Fisheries Social Science Research Network Forum 1 (AFSSRN F1) on 24.11.2021

Women in Small Scale Fisheries in India, In Women work in Fisheries, Too!" organized by GAFS of AFS, USAID RDMA CTI-CFF, ICAR-CIFT, SOFTI on 29.11.2021

Dr. Manoj P. Samuel

Improved techniques of fish processing and entrepreneurship development, In Training programme on Improved techniques of fish processing and entrepreneurship development for three participants from Ladakh and J&K region under Naropa Fellowship programme on 01.02.2021

Improved techniques of production of value-added fish and Fishery products, In PMMSY training program on 12.02.2021

Dr. Bindu J.

Processing and value addition in mussels, State level seminar on PMFME scheme one district one product organized by the Department of Industries and commerce, Government of Kerala on 13.08.2021

Prospective of development of edible packaging from fishery waste, In National Webinar on Utilization of fishery wastes for reducing post-harvest loss with a focus on the scope of entrepreneurships organized by the College of Fisheries, Lembucherra on 28.09.2021

Fish Processing and Value addition, In ODOP seminar organized by NIFTEM, Thanjavur on 28.09.2021

Non-thermal methods of fish processing, Technology Based Entrepreneurship Development Programme (TEDP) funded by DST (Govt. of India) organized by Kerala University of Fisheries and Ocean Studies-Department of Fish Processing Technology & Centre for Advanced Studies and Research Entrepreneurship Development on 05.10.2021

Mussels- Farming and Options for value addition, In International webinar organized by the Pravasis academy & Pravasis Welfare and Development Cooperative society, Malappuram on 31.12.2021

Dr. Muhamed Ashraf P.

Nano Technology Application in Fishing Material Protection, In ITEC training programme on Recent Advances in Harvest and Post-Harvest Technologies in Fisheries on 30.10.2021

Dr. U. Sreedhar

Advances in Fishing Technology, In Addressing the final year B.F.Sc. students of College of Fisheries, Lembucherra on 17.03.2021

Responsible fishing for conservation of marine fishery resources, In the national webinar on "Current status and prospects of Indian fisheries" Organized by Dept. of Fishing Technology and fisheries engineering, Dr. MGR Fisheries College and Research Institute, Tamil Nadu on 28.07.2021



Dr. Ashaletha S.

Value chain management in fisheries with a gender focus, In ICAR-CIFT in collaboration with African-Asian Rural Development Organization (AARDO) on 16.09.2021

Promotion of Technologies and Extension Strategies for Value Addition and Post-Harvest Technologies for the Officers of Fisheries Sector, In Online Training Program organised by by Extension Education Institute(EEI), (Southern Region), Dept. of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Govt. of India, Hyderabad on 17.09.2021

Extension Strategies for the Officers of Fisheries Sector in the topic Climate Smart Extension in Fisheries, In Online Training Program organised by by Extension Education Institute (EEI), (Southern Region), Dept. of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Govt. of India, Hyderabad on 21.10.2021

Entrepreneurship development of women in fisheries and allied sectors, In Online Training program "Gender dimensions for Knowledge Integration and Sustainable Food systems through IFS" organized by MANAGE, ICAR-CPCRI and ICAR- NIANP on 05.12.2021

Dr. Femeena Hassan

Essentials of hygiene and sanitation in fish handling, In Online Training on Processing and Quality Assurance in fisheries for B.F.Sc. students of College of Fisheries, Dholi (RPCAU, Bihar) on 16.09. 2021 to 06.10.2021

Dr. B. Madhusudana Rao

Opportunities & Challenges in Cold Chain in Seafood Industry in the state of Andhra Pradesh, In ASSOCHAM & NABARD webinar on Revamping the Future Indian Cold Chain Industry: Innovation, Challenges, Trends, Opportunities and Way Forward in the State of Andhra Pradesh organized by The Associated Chambers of Commerce and Industry of Indian (ASSOCHAM) on 04.03.2021

Antibiotic residues and Antimicrobial Resistance (AMR) in Fisheries, In Training of Village Fisheries Assistants of Government of Andhra Pradesh at State Institute of Fisheries Technology, Kakinada on 26.04.2021

Fish and Marine Products Processing, In Online Entrepreneurship Development Programme – Food Processing organized by the Federation of Andhra Pradesh Chambers of Commerce and Industry (FAPCCI) on 08.07.2021

AMR in Aquaculture, In -service training of FDO's of the Government of Andhra Pradesh, organized by SIFT, Kakinada on 07.10.2021

Antimicrobial resistance in Aquaculture: An overview of the drivers and mitigation measures, In Marine Products Exports Export Development Authority (MPEDA), Kochi as part of World Antimicrobial Awareness Week on 24.11.2021

Food Safety (Standards, GMP, GHP, HACCP), In LINAC-NCDC Fisheries Business Incubation (LIFIC), National Cooperative Development Corporation (NCDC) on 29.11.2021

Trends in Refrigeration for Fisheries, In REFCOLD Refrigeration and Cold Chain Conference-2021 by ISHRAE on 18.12.2021

Dr. A. Suresh

Valuing Water: Social and Environmental Perspective, In World Water Day organised by Indian Institute of Spices Research, Calicut on 22.03.2021


Technical change in agricultural development – Perspectives, In Web- Lecture series on 'Agricultural development and economic transformation on 12.08.2021

Vulnerability assessment to climate change - gaps and challenges, In Regional seminar of the Indian Society of Agricultural Economics on 12.11.2021

Dr. G. K. Sivaraman

Challenges & Mitigation Strategies of AMR in Aquatic Animal Health, In One-Health Perspective, In World Antimicrobial Awareness Week 2021' on 'Managing AMR in Context of Public and Animal Health by Indian Association for the Advancement of Veterinary Research (IAAVR) In collaboration with Zenex Animal Health India Private Limited on 18.11.2021

Times of Biotech Science Talk Show, In AMR in aquaculture on 29.11.2021

Dr. Madhu V. R.

Trawling regulations with special reference to square mesh, In Training programme on Fishing gear regulations in Kerala under PMMSY on 17.02.2021

Principles of fishing gear design and importance of fish behaviour studies for gear improvement, In ITEC training program on Recent Advances in Harvest and Post-Harvest Technologies in Fisheries on 28.10.2021 and 10.11.2021

Dr. Asha K. K.

Bioprospecting of Marine derived metabolites for promising biotechnology applications, In National conference on Bioprospecting of Marine derived metabolites for promising biotechnology applications: Current and future prospects on 29.12.2021 to 31.12.2021

Dr. Satyen Kumar Panda

Regulations and standards for maintaining safety and quality of fish products - FSSAI and International standards, In Online Training of Master Trainers (ToMT) on Fish and Marine Products Processing-under Capacity Building Component of PM Formalization of Micro Food Processing Enterprises (PM-FME) Scheme of Ministry of Food Processing Industries, Government of India on 04.01.2021 to 08.01.2021

Regulatory requirements of Fish and Fish Products, In Training programme on Improved techniques of fish processing and entrepreneurship development for participant from Ladakh and J & K region under Naropa Fellowship program on 17.02.2021

Webinar on Standard Development and its importance in Indian Fisheries, In Standard, Certification and Traceability in Fisheries Sector organized by Ministry of Fisheries, Animal Husbandry and Dairying, Government of India on 29.06.2021

Status of microbiological standards as per FSSR and its comparison with different international standards, In ICMSF – CHIFSS 1st Consultative Session on Enhancing Microbiological Quality and Safety for Fisheries Sector in India on 12.07.2021 to 13.07.2021

Webinar on Quality and Safety Issues in Fisheries Sector, In Food safety and hygiene in food industry- role of Indian standards organized by Bureau of Indian Standards on 22.07.2021



Status of microbiological standards as per FSSR and its comparison with different international standards, In ICMSF – CHIFSS 2nd Consultative Session on "Enhancing Microbiological Quality and Safety for Fisheries Sector in India on 04.10.2021 to 05.10.2021

Dr. L. N. Murthy

Fresh water fish utilization and value addition: an overview, In Farmers training on Food Processing under PMFME scheme organized by CSIR-Central Food Technological Research Institute (CFTRI) on 18.02.2021

Entrepreneurship and marketing Opportunities in Fisheries, In Online Training Programme organized by Sindhu Swadhyay Sanstha, University on 12.05.2021

Emerging Trends in Fish Preservation and Processing, In Webinar organized by college of Fisheries Science, Jabalpur on 23.06.2021

Fresh water fish processing and Entrepreneurship development and marketing in fisheries, organized by Dept. of fish processing technology & Centre for Advanced Studies and Research in Entrepreneurship Development in Fisheries, Agri-Business and Allied Sectors, KUFOS & sponsored by National Science & Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology, Ministry of Science and Technology, Govt. of India on 24.09.2021

Dr. M. V. Baiju

Different designs of fishing vessels in India, In Improved Craft and Gears organised by Mumbai, RC of CIFT under PMMSY online training programme on 05.02.2021 to 06.02.2021

Energy saving in fishing vessels for green fishing, In ITEC training programme on Recent Advances in Harvest and Post-Harvest Technologies in Fisheries on 01.11.2021

Principal dimensions and engine power limitations, In Training programme on Fishing gear regulations in Kerala under PMMSY on 28 October to 10.11.2021

Dr. Mohan C. O.

Chitosan for Smart Packaging applications, In the 9th Indian Chitin & Chitosan Society Symposium 2021 (9th ICCSS2021) organized by Visvesvaraya National Institute of Technology (Nagpur) in collaboration with National Institute of Technology (Agartala) and Indian Chitin & Chitosan Society on 26-28.02.2021.

Innovative Packaging Technologies, VAIGA - AGRI HACK 2021 organized by SAMETI, Department of Agriculture Development & Farmers' Welfare, Govt of Kerala on 12.02.2021

Marketing and Branding fish-based products, In Training programme organized by CSIR-CFTRI, Mysore on 20.02.2021

ICAR-CIFT Technologies, AQUAPRENEURSHIP- Institute Industry Interface organized by Agri Innovate India Ltd., New Delhi on 25.02.2021

Recent Advances in Packaging of Fish Products, In International Symposium on Coastal Agriculture (ISCA Webinar): Transforming Coastal Zone for Sustainable Food and Income Security, on 16.03.2021 to 19.03.2021

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Recent trends in packaging: packaging as a marketing tool, Cohort 5, In Training Program under RKVY-RAFTAAR, organized by MANAGE-Hyderabad on 24.07.2021

Panel Discussion on Farm to Fork: Building Digital Supply Chains, Summit on Agriculture 4.0 : future Innovation for Farming during 2nd edition of The Smartec Initiative India 2021 on 03-15.12.2021

Dr. Pe. Jeyya Jeyanthi

Fish marketing and price discovery in fish value chain, In International training programme by African-Asian Rural Development Organization (AARDO) on 13.09.2021

Dr. Binsi P. K.

Fish as Food: Health and beauty, In Expert interaction organized by VHSE School, Njarakkal on 02.01.2021

Fish for health and wealth, In National Webinar organized by D.El.Ed, Jamia Islahia ITE, Pulikkal in connection with National Science Day celebration on 05.03.2021

Frontline research on Marine molecules: Opportunities and industrial potential, National webinar on Frontline research on Marine molecules organized by SAFI Institute of Advanced Studies, Vazhayoor on 19.05.2021

Pre-Processing and Traditional Techniques of Sun-Drying and Salting of Fish, One Day National Online Training Programme on Pre-Processing and Drying of Fishes organized by College of Fishery Science Jabalpur Nanaji Deshmukh Veterinary Science University Jabalpur on 23.06.2021

Marine nutraceuticals from seafood waste, In Training programme on Processing and Quality Assurance in Fisheries for students of College of Fisheries, Dholi (RPCAU, Bihar) on 29.09.2021

Fish waste to wealth, National Technology Based Entrepreneurship Development Programme (TEDP) organized jointly by Kerala University of Fisheries and Ocean Studies & Centre for Advanced Studies and Research Entrepreneurship Development on 08.10.2021

Solid waste management and effluent treatment methods, In Induction training programme for Junior Level Executive Staff, Fisheries Department, Kerala on 30.10.2021

Dr. Ashish Kumar Jha

Seaweeds: Scope and potential, In Indian Technical and Economic Cooperation (ITEC) Programme on Recent advances in harvest and post-harvest technologies in fisheries on 28.10.2021 to 10.11.2021

Development of seaweed-based products and relevant quality issues, In Indian Technical and Economic Cooperation (ITEC) Programme on Quality assurance of fish and fishery products on 16.11.2021 to 29.11.2021

Dr. Murugadas V.

Antimicrobial resistance: detection and control in fisheries sector, In WAAW 2021 at KUFOS, Cochin on 18.11.2021

Dr. Viji P.

Role of ICAR-CIFT in Harvest and Post-Harvest fisheries sector of India, In Addressing the final year B.F.Sc. students of College of Fisheries, Lembucherra on 18.03.2021



Webinar on Value addition of fish and fish products, In Retail fish marketing organized by National Institute for micro, small and medium enterprises, Hyderabad on 24.06.2021

Dr. A. Jeyakumari

Preparation of value-added fishery products and packaging technologies, on line Training programme on "Preparation of Value-added Fish Products for Boosting Fishpreneurship under PMMSY- ICAR-DoF convergence on 19.01.2021

Fish waste utilization, Online training programme on Processing and Quality Assurance in fisheries sector for B.F.Sc students of College of Fisheries, Dholi on 29.09.2021

Webinar on High value products from seafood processing Discard, In Seafood waste Utilization-Challenges and Opportunities, College of Fish Nutrition and Food technology, Chennai on 27.11.2021

Packaging and Quality evaluation of dried fish, Preprocessing and Drying of Fish on 09.12.2021

Dr. Sandhya K. M.

Trends and prospects of inland fisheries, In ITEC training program on Recent Advances in Harvest and Post-Harvest Technologies in Fisheries on 28.10.2021 to 10.11.2021

Fishing with gillnets: Environmental impacts and mitigation measures organized by NFDB Sponsored one day webinar on Maintenance and Repairing of Fishing Gears and Crafts under PMMSY, by Division of Fishery Engineering, Faculty of Fisheries, SKUAST-Kashmir on 13.11.2021

Dr. Prajith K. K.

Sustainable fishing operations organized by Rural Fisheries Work Experience Programme (RFWEP) of College of fisheries, Junagdh Agricultural University on 20.01.2021

Sustainable fishing operations, In Rural Fisheries Work Experience Programme (RFWEP) of College of fisheries on 20.01.2021

Recent developments in Fishing Technology organized by Research Department of Fisheries and Aquaculture, St. Alberts College, Ernakulam on 04.12.2021

Dr. Niladri S. C.

Nutraceutical and Functional Foods from seaweed, In Seaweed India 2021 conference on 19.11.2021

Technologies and Business models for nutraceutical and functional food products from seaweeds, In Blue Economy An ocean of Opportunities for innovation and building sustainable startups and industries on19.11.2021

Food Fraud Prevention and Mitigation, In CII 1st Overseas study mission on Food Safety and Quality, 2021 on 25.05.2021

Dr. Remya S.

Physico-chemical indices for quality and mechanism of spoilage in fish, In Training programme on 'Improved techniques of fish processing and entrepreneurship development' for the participants from Ladakh and J&K region under Naropa Fellowship Programme on 25.01.2021 to 28.02.2021



Webinar on Traditional and advanced methods for quality assessment of seafood, In National Webinar entitled 'Current Trends and Future Prospects in Fish Processing Technology', organized by Department of Fish Processing Technology, College of Fishery Science, Pebbair (P V Narsimha Rao Telangana Veterinary University, Telangana) on 25.03.2021

Fish Processing Technology, In Special lecture series for JRF preparation organized by College of Fisheries, Veraval, Gujarat for BFSc students on 25.032021

Packaging and labelling of fish and fishery products, organized by State Agricultural Management and Extension Training Institute (SAMETI), Kerala on 06.07.2021

Eco-Kids to Eco-Citizens, World Nature Conservation Day programme organized by the Science Club of GHS School, Pezhakkappilly, Ernakulam (A Centre of Excellence School) on 28.07.2021

Technologies for Processing & Value Addition of Fish, Technical session of Virtual Expo for Food Sector organized by FoodTech India on 25.08.2021

Non-thermal techniques: scope and future perspectives, International Training Programme on 'Advanced techniques in fishing and fish processing', jointly organized by African-Asian Rural Development Organization (AARDO), New Delhi and ICAR-CIFT, Cochin on 31 August to 09.092021

Quality Control Measures of Fisheries, Products & its Certification, Promotion of Technologies and & Extension Strategies for Value Addition and Post-Harvest Technologies for the Officers of Fisheries Sector' for the officers of Department of Fisheries, South Indian States and UTs, organized by Extension Education Institute (Southern Region), Department of Agriculture & Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Govt. of India, Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad on 16.09.2021

Non-thermal techniques in fish preservation, Processing and Quality Assurance in Fisheries' from 16 September 2021 to 06 October 2021 for the Bachelor of Fisheries Science (BFSc) students from College of Fisheries, Dholi (RPCAU, BIHAR) on 30.09.2021

Dr. Laly S. J.

Chemical hazards in fish and fishery products, In Online training to final year B.F.Sc students of Kerala University of Fisheries and Ocean Studies (KUFOS) on 15.05.2021

Overview of good hygienic practices and HACCP for seafood processing industries, In Technology Based Entrepreneurship Development Programme (TEDP) Organized by KUFOS, Cochin on 05.10.2021

Fish spoilage causative agents, process and public health hazards, In Online training programme for Junior level executive staff, Fisheries department, Kerala on 29.11.2021

Overview of good hygienic practices and HACCP for seafood processing industries, In Technology Based Entrepreneurship Development Programme (TEDP) Organized by KUFOS, Cochin on 29.11.2021

Dr. Jesmi Debbarma

Seaweed: value addition and commercial application, In online training program on "Promotion of Technologies and Extension Strategies for Value Addition and Post-Harvest Technologies for the Officers of Fisheries Sector" Organized by Extension Education Institute (EEI), Hyderabad on 18.09.2021



Seaweeds as a Functional Ingredient for cereal products" and "Value added mussel products, In the online Technology Based Entrepreneurship Development Programme (TEDP) funded by DST (Govt. of India) organized by Kerala University of Fisheries and Ocean Studies- Department of Fish Processing Technology & Centre for Advanced Studies and Research Entrepreneurship Development on 27.09.2021

Dr. Manju Lekshmi N.

Boat Building Materials, Students of College of Fisheries Science, Nanaji on 30.03.2021

Dr. Parvathy U.

Specialty Fish Products, Online Training of Master Trainers (ToMT) on Fish and Marine Products Processing under Capacity Building Component of PM Formalization of Micro Food Processing Enterprises (PM FME) Scheme of Ministry of Food Processing Industries, Government of India, 04.01.2021 to 08.01.2021

Specialty Fish Products, Fish Curing and Drying, Training programme on 'Improved techniques of fish processing and entrepreneurship development' for the participants from Ladakh and J&K region under Naropa Fellowship programme on 27.01.2021 to 28.02.2021

Post-Harvest Fish Handling, Fisheries-NIFAM-Trainers Training Programme for Vocational Higher Secondary School teachers and instructors on 02.03.2021 to 05.03.2021

Value added fish and fishery products, Training programme for farmers and entrepreneurs organized by CAU, Imphal on 22.03.2021 to 24.03.2021

Onboard fish handling, Expert interaction to Second year VHSE NSQF-FSPT students of GVHSS Arthungal -Under VHSE-NSQF curriculum for Fishing Boat Mechanic on 26.03.2021

Seafood Handling and Processing, Expert interaction to Second year VHSE NSQF-FSPT students of GVHSS Narakkal on 27.08.2021

Handling and transportation of fish and shellfish Preparation of Cured and Dried fishery products, Processing and Quality Assurance in Fisheries for the Bachelor of Fisheries Science (B.F.Sc.) students from College of Fisheries, Dholi (RPCAU, BIHAR) on 16.09.2021 to 06.10.2021

Drying: Principle, factors affecting fish drying, types of dryers, spoilage in dried products and measures to prevent spoilage, Training for Junior Level Executive Staff, Fisheries Department, Kerala on 01 to 30.10.2021

Dr. Anupama T. K.

Quality issues in fish pickle, In Indian Technical and Economic Cooperation (ITEC) Programme on "Quality assurance of fish and fishery products on 16.11.2021 to 29.11.2021

Dr. Pankaj Kishore

Webinar on Mastering HPLC Method Development, In International Webinar Series on organized by ACS, USA on 17.06.2021

New Insights into Disease Through Ultrasensitive Detection Technology, In Virtual Conference by Merck on 18.06.2021

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Investigation of nanomechanical properties using AFM with live demo, In Live webinar series on 08.07.2021

Webinar on Nanoscale research using AFM and techniques, In Webinar series organized by Park Systems on 28.09.2021

Dr. Elavarasan K.

Fish in human nutrition, Dr. MGR Fisheries College and Research Institute, Ponneri, TNJFU, in connection with Foundation day celebration on 19.06.2021

Value added fish products and utilization of fish waste, organized by KVK, Needamnagalam on the topic of 'Management of Fishery Waste' on 24.06.2021

Fish Waste Management in COVID Pandemia, ICICI Foundation for the regional farmers on the topic of 'Fish Waste Management' on 27.06.2021

Entrepreneurship Development Programme (TEDP) funded by DST (Govt. of India) organized by Kerala University of Fisheries and Ocean Studies- Department of Fish Processing Technology & Centre for Advanced Studies and Research Entrepreneurship Development on 25 August to 11.10.2021

Fish Protein hydrolysate-A potential additive in the food industry, Technology Based Protein and protein derivatives from aquatic food processing waste, e-training programme "Advanced techniques in Fishing and Fish Processing organized by AARDO on 31.08.2021 to 19.09.2021

Protein and protein derivatives from aquatic food processing waste, training programme on "Processing and Quality Assurance in Fisheries' for the Bachelor of Fisheries Science (B.F.Sc.) students from College of Fisheries, Dholi (RPCAU, BIHAR) organized by ICAR-CIFT, Cochin on 16.09.2020 to 06.10.2020

Dr. Rejula K.

Covid 19; Disruptions in Agricultural and food systems, For the student of Carmal College Thrissur on 07.08.2021

Group approach in fisheries value chain management: Evidences from the field In International training programme by African-Asian Rural Development Organization (AARDO) on 13.09.2021 to 16.09.2021

Dr. Devananda Uchoi

HACCP implementation for fishery products, In Online Training of Master Trainers (ToMT) on Fish and Marine Products Processing" under Capacity Building Component of PM Formalization of Micro Food Processing Enterprises (PMFME) Scheme of Ministry of Food Processing Industries, Government of India on 04.01.2021 to 08.01.2021

Dr. Sarika S.

Non Thermal processing of fish, In Indian Technical and Economic Cooperation (ITEC) Programme on "Quality assurance of fish and fishery products on 16.11.2021 to 29.11.2021

Shri Paras Nath Jha

Remedial classes on Fishing Technology, UG (Students of Fishery Science) students under Institutional Development Plan-National Agricultural Higher Educational Project, College of fisheries GBPUA&T, Pantnagar on 01.01.2021



Measures to mitigate bycatch incidences in fishing and bycatch reduction devices, NFDB Sponsored one day webinar on "Maintenance and Repairing of Fishing Gears and Crafts" under PMMSY, Organized by Division of Fishery Engineering, Faculty of Fisheries, SKUAST-Kashmir on 13.11.2021

Dr. S. Murali

Novel fish drying techniques and preservation, In PMMSY training program on 02.03.2021, 05.03.2021 and 12.03.2021

Sustainable energy options for drying of fish, In Virtual Symposium on Solar Energy in Post-Harvest Sector organized by ICAR-CIPHET, Ludhiana on 29.05.2021

Engineering interventions in fish handling and processing operations, In International training programme on 'Value chain management in fisheries' sponsored by AARDO by virtual mode on 14.09.2021

Application of dryers in the fishery sector, In Processing and Quality Assurance in Fisheries from 16th Sept 2021 to 06th Oct 2021 for the Bachelor of Fisheries Science (B.F.Sc.) students from College of Fisheries, Dholi (RPCAU, BIHAR) on 27.09.2021

Equipment and machinery for micro fish processing unit, In Fish processing and value addition' Webinar organized by NIFTEM, Thanjavur and ICAR-CIFT on 27.10.2021

Shri Chinnadurai S.

Basic Principles of Design of Fishing Gears and their Classification, In Webinar on Care and maintenance of fishing gears and crafts' jointly organised NFDB, Hyderabad and SKUAST-Kashmir on 13.11.2021

Diversity and Inter Annual Variation of Jellyfish Abundance Along The Southeast Arabian Sea, India: An Analysis From Trawl Catch, In Sixth International Conference on Fisheries and Aquatic Sciences (ICFAS 6) and the First Asian Fisheries Social Science Research Network Forum (AFSSRN F1) on 24.11.2021 to 26.11.2021

Dr. J. Renuka

Official Language Workshop in ICAR-IISR, Kozhikode on 28.09.2021

Human Resource Development (HRD) Cell

The Human Resource Development Cell of ICAR-CIFT met several times for deliberations and decision-making with regard to training requirements of staff. Individual requests of staff members of all categories for their capacity building needs were processed for approvals. In addition, necessary approvals were obtained from the competent authority to enable staff who were specifically nominated by ICAR to undergo training. As recommended by HRD Cell, staff of CIFT (Total staff-231, Scientific-80, Technical-73, Administrative & Finance-78) participated in 28 training programmes during the year. The HRD Cell ensures that every employee records the training information in the ICAR-ERP system following completion of the training. Training needs assessment and Annual Training Plan (ATP) for Scientific, Technical, Administrative and Skilled Support Staff were made for the year 2021 and the ATP 2021-22 has been uploaded on the Institute website. Upon a request from the HRM Division of ICAR, category-wise and employee-wise skill deficient areas were furnished to the Council based on which the ATP 2020-22 was revised to include staff who hadn't undergone training during the past 7 years.

Sci	Scientific Staff				
SI. No	Name(s) of participant(s)	Training attended	Venue and date		
1	Dr. Abhay Kumar	Hindi Bhasha Dirghkaalik Parangat training course conducted by Hindi teaching scheme	(Online Mode) 01.01.2021 to 31.05.2021		
2	Dr. Sarika. K Dr. D. S. Aniesrani Delfiya Dr.S.Monalisha Devi	DST Sponsored online Training Programme on Science & Technology for Rural Society	Indian Institute of Public Administration (IIPA), New Delhi 04.01.2021 to 08.01.2021		
3	Dr. G. K. Sivaraman	Virtual Bionumerics Workshop organized by bioMerieux, Bioinformatics Specialist, Belgium.	(Online Mode) 18.01.2021 to 20.01.2022		

Participation of staff in Training Programmes 2021



4	Dr. Pe. Jeyya Jeyanthi	Online training programme on Geospatial Analysis using QGIS & R	ICAR-NAARM, Hyderabad; 01.02.2021 06.02.2021.	
5	Shri. Sathish Kumar K. Dr. Sarika. K	Online skill Training on BIOPLASTICS- recent trends and Developments	CIPET, Kochi 01.02.2021 to 12.02.2021	
6	Dr. Leela Edwin Dr. Baiju M. V. Dr. Madhu V. R. Dr. Sandhya K. M. Dr. Manju Lekshmi N. Shri Chinnadurai S. Shri Paras Nath Jha	The use and applications of liquefied natural gas and the safety aspects	Petronet LNG, Kochi 08.02.2021	
7	Dr. Prajith K. K.	rajith K. K. Safety of responsible fishing at sea 09.02. under PMMSY to 10.02		
8	Shri. Sreejith S.	Plastics Processing Techniques and Quality Control"	CIPET, Kochi 15.02.221 to 26.02.2021	
9	Dr. Prajith K. K.	Fishing gear regulations in Kerala and demonstration of gear testing under PMMSY	(Online Mode) 16.02.2021 to 17.02.2021	
10	Dr. M.V. Baiju	Concept formulation of standards and standardization	(Online Mode) BIS, New Delhi 17.02.2021 to 18.02.2021	
11	Dr. Madhu V. R.	online training program on Data visualization in Agribusiness and Agri research	(Online Mode) NAARM 22.02.2021 to 27.02.2021.	
12	Dr. B. Madhusudana Rao Dr. Ahamed Basha	Online training programme-Baclink component of the WHONET 5	(Online Mode) INFAAR 23.02.2021 to 25.02.2021	
13	13Dr. B. Madhusudana RaoVirtual training Programme for the members of Bureau of Indian Standards (BIS) Technical Committees(Online Model 24.05.20 to 25.05.20		(Online Mode) 24.05.2021 to 25.05.2021	



14	Dr. Parvathy U. Biodiversity and Environmental Laws for Agricultural Researchers (BELAR '21)		ICAR-NAARM 07.06.2021 to 09.06.2021
15	Dr. Saly N. Thomas Implementation and Use of Agricultural Research Management System (ARMS)		(Online Mode) ICAR-IASRI 08.06.2021
16	Dr. Remya S.	Labelling Display and Packaging Materials Regulations of FSSAI	(Online Mode) 25.07.2021 to 27.07.2021
17	Dr. Remya S.	Entrepreneurship Development Program in Food Processing	(Online Mode) 26.07.2021 to 30.07.2021
18	Dr. B. Madhusudana Rao Dr. Ahamed Basha	Virtual Training Course on Surveillance and Monitoring of Antimicrobial Resistance in Aquaculture	(Online Mode) FAO & INFOFISH 26.07.2021 to 30.07.2021
19	Dr. A. K. Mohanty	Online training workshop for Vigilance officers of ICAR Institutes organized by ICAR-NAARM, Hyderabad	(Online Mode) 16.08.2021 to 18.08.2021
20	Dr. Mohan C. O. Dr. Pankaj Kishore Dr. Murugadas V.	NABL Assessors' Training Course on ISO/IEC 17025: 2017' and Level - 1 of the training programme	(Online Mode) 25.08.2021 to 27 .08.2021
21	Dr. Viji P.	Accessing your Library eResources using MyLOF	ICAR-CIFT, Kochi 14.09.2021
22	Dr. G.K. Sivaraman	Emotional Intelligence at Workplace for Scientists and Technologists, by DST, GOI	COD, Hyderabad, 20.09.2021 to 24.09.2021
23	Dr. A. Suresh	MDP on 'Market Research and Value Chain Management of Agricultural Commodities	NAARM, Hyderabad 21.09.2021 to 25.09.2021
24	Dr. G. K. Sivaraman	Generic Online Training in Cyber Security	(Online Mode) 28.09.2021
25	Dr. Mohan C. O. Dr. Murugadas V Dr. Pankaj Kishore	NABL Assessors' Training Course (Level-2) based on ISO/IEC 17025: 2017	Bengaluru 21.10.2021 to 23.10.2021
26	Dr.T.V.Sankar	Online Training on "MDP on PME in Agricultural Research Projects"	ICAR-NAARM, Hyderabad 25.10.2021 to 30.10.2021.



27	Dr. Satyen Kumar Panda	Online Training programme for Chairs, Conveners and experts in international committees	NITS & BIS, New Delhi 10.11.2021 to 11.11.2021	
28	Dr. V. Renuka	Nanotechnology and its advanced application	(Online Mode) 22.11.2021 to 26.11.2021	
29	Dr. Lekshmi R.G.Kumar, Smt. Muthulakshmi. T	Creativity & innovation management in research for Women Scientists, under Women Component DISHA	(Online Mode) ESCI, Hyderabad 22.11.2021 to 26.11.2021	
30	Dr. Renuka.V	Nanotechnology and its advanced application	(Online Mode) ICAR-CIRCOT 22.11.2021 to 26.11.2021	
31	Shri S. Ezhil Nilavan	Regional Capacity building programme on Biotechnological tools in Aquatic Genetic Resource Management and ex situ conservation (module-1)	(Online Mode) ICAR-NBFGR & APARRI 16.12.2021 to 22.12.2021	
32	Dr. V. Chandrasekar	Impact Assessment of Agricultural Research and Technologies	18.12.2021 to 22.12.2021	
33	Dr. Rehana Raj	Government e-Marketplace (GeM) training organized by ICAR-CIFT, Cochin	(Online Mode) 20.12.2021	
34	Dr. R. Raghu Prakash Dr. Viji P. Online training on Government e-Marketplace		(Online Mode) ICAR-CIFT, Kochi 21.12.2021	
Тес	hnical Staff			
1	Smt. Sangeeta Gaikwad Smt. Priyanka Nakhawa Smt. Megha G. Shri Tulshiram Waghmare		Online Mode 01.01.2021 to 31.05.2021	
2	Smt. Sangeeta Gaikwad Smt. Triveni Adiga Smt. Priyanka Nakhawa Smt. Megha G Shri Tulshiram Waghmare	Online training programme on Preparation of Value-added Fish Products for Boosting Fish preneurship	(Online Mode) ICAR-CIFT 19.01.2021 to 20.01.2021	
3	Dr.T.V.Bhaskaran	Handling Parliamentary Matters (H- PM) for Group A & Group B Officers	(Online Mode) ISTM, New Delhi 28.01.2021 to 29.01.2021	

Human Resource Development Cell



4	Smt. Sangeeta Gaikwad Smt. Triveni Adiga Smt. Priyanka Nakhawa Smt. Megha G. Shri Tulshiram Waghmare	Online Training programme on Improved Fishing Crafts and gears under PMMSY-ICAR-DoF convergence	(Online Mode) ICAR-CIFT & NFDB 05.02.2021 to 06.02.2021	
5	Shri Vipin Kumar V. Dr. Dhiju Das P. H. Shri Nobi P.S. Shri Dileepkumar V. N. All vessel staff	The use and applications of liquefied natural gas and the safety aspects	Petronet LNG, Kochi 08.02.2021	
6	Smt. Sangeeta Gaikwad Smt. Triveni Adiga Smt. Priyanka Nakhawa Smt. Megha G. Shri Tulshiram Waghmare	Online Training programme on Improved techniques of production of value-added fish products under PMMSY-ICAR-DoF convergence	(Online Mode) ICAR-CIFT & NFDB 20.02.2021	
7	Smt. Triveni Adiga	Training programme 'Preparation of extruded fish products'	(Online Mode) ICAR-CIFT 23.02.2021	
8	Shri Vinod G.	Plastics Processing Techniques and Quality Control	CIPET, Kochi 15.02.2021 to 26.02.2021	
9	Smt. Sruthi	Online Collaborative Training Programme on Quantitative and Qualitative Methods in Labour research"	(Online Mode) VVGNLI, Uttar Pradesh, & MGLI, Ahmedabad 19.02.2021	
10	Smt. Priyanka Nakhawa	Training Programme on Statistics for Social Science Scholars for ICAR-CIFE Students using R/ SPSS software	(Online Mode) ICAR-IASRI 23.02.2021 to 22.03.2021	
11	Smt. Shyma. P. K.	"Solar Photovoltaic System Design"	SPRERI, Gujarat 01.03.2021 to 02.03.2021	
12	Smt. Sangeeta Gaikwad Smt. Triveni Adiga Smt. Priyanka Nakhawa Smt. Megha G. Shri Tulshiram Waghmare	Online Training programme on Importance of HACCP and ISO 22000 in Seafood Processing & Quality Control under PMMSY-ICAR- DoF convergence	(Online Mode) ICAR-CIFT & NFDB 20.03.2021	
13	Shri Rakesh M Raghavan	ICT and Mass Media in Agricultural Extension	BAU, Ranchi & MANAGE, Hyderabad 04.05.2021to 08.05.2021	
14	Smt. Priyanka Nakhawa	Training programme on Entrepreneurship Development in Fisheries Sector	(Online Mode) ICAR-NAARM & ICAR-CIFE 17.07.2021	
15	Shri Kriplani Yogeshkumar Dharamdas	Appropriate sampling techniques including sample preparation and preservation for soil, water, plant and air samples for various analyses	(Online Mode) ICAR-IARI 02.08.2021 to 07.08.2021	



16	Dr. Parmanand Prabhakar	Appropriate sampling techniques including sample preparation and preservation for soil, water, plant and air samples for various analyses	(Online Mode) ICAR-IARI 02.08.2021 to 07.08.2021	
17	Smt. Shyma P K.	Online Training Programme for Administrative/Technical staff associated with Works/Estate/ Building Maintenance	ICAR-CIAE, Bhopal 10.08.2021 to 12.08.2021	
18	Shri Vipin Kumar V. Dr. Dhiju Das P. H.	Awarness Training in Additive Manufacturing and ITS Application Under Future Skills PRIME programme, NIELIT, Calicut	(Online Mode) 25.08.2021 to 07.09.2021	
19	Smt. Rekha M. Smt. Prinetha U.P. Shri Sreejith V. N. Smt. Reshmi K.	Application of Bioinformatics in Agricultural Research and Education	(Online Mode) 20.09.2021 to 24.09.2021	
20	20 Smt. Rekha M. Smt. Prinetha U. Smt. Reshmi K. Dr. Sreeiith V.N		SKILL-BIF, ICAR-NAARM, Hyderabad 20.09.2021 to 24.09.2021	
21	Smt. Sangeeta Gaikwad Smt. Triveni Adiga Smt. Megha G. Shri. Tulshiram Waghmare	Government eMarket place (GeM) training	(Online Mode) ICAR-CIFT 20.12.2021	
	Vagrimarc			
	Administrative Staff			
1	Administrative Staff Shri. Avinash Agawane Smt. Bhavyamol C. G.	Hindi Bhasha Dirghkaalik Parangat training course conducted by Hindi teaching scheme	(Online Mode) 01.01.2021 to 31.05.2021	
1	Administrative Staff Shri. Avinash Agawane Smt. Bhavyamol C. G. Shri. Sabukuttan. K.B.	Hindi Bhasha Dirghkaalik Parangat training course conducted by Hindi teaching scheme Technical Service Rules" for Assistants/AAOs/AOs/ SAOs/ Technical staff/other staff of ICAR- Institutes dealing with Technical Service Rules	(Online Mode) 01.01.2021 to 31.05.2021 (Online Mode) ICAR-NAARM, Hyderabad 06.01.2021 to 08.01.2021	
1 2 3	Administrative Staff Shri. Avinash Agawane Smt. Bhavyamol C. G. Shri. Sabukuttan. K.B.	Hindi Bhasha Dirghkaalik Parangat training course conducted by Hindi teaching scheme Technical Service Rules" for Assistants/AAOs/AOs/ SAOs/ Technical staff/other staff of ICAR- Institutes dealing with Technical Service Rules Training Programme on Accrual Accounting" for AF&AO/F&AO/ Sr F&AO and other staff of ICAR- Institutes & HQs	(Online Mode) 01.01.2021 to 31.05.2021 (Online Mode) ICAR-NAARM, Hyderabad 06.01.2021 to 08.01.2021 (Online Mode) ICAR-NRRI, Cuttack 12.01.2021 to 14.01.2021 (Batch-I)	
1 2 3 4	Administrative Staff Shri. Avinash Agawane Smt. Bhavyamol C. G. Shri. Sabukuttan. K.B. Shri. K.S. Sreekumaran Smt. Febeena P.A	 Hindi Bhasha Dirghkaalik Parangat training course conducted by Hindi teaching scheme Technical Service Rules" for Assistants/AAOs/AOs/ SAOs/ Technical staff/other staff of ICAR-Institutes dealing with Technical Service Rules Training Programme on Accrual Accounting" for AF&AO/F&AO/ Sr F&AO and other staff of ICAR-Institutes & HQs Training Programme on Accrual Accounting for AF&AO/F&AO/ Sr F&AO and other staff of ICAR-Institutes & HQs 	(Online Mode) 01.01.2021 to 31.05.2021 (Online Mode) ICAR-NAARM, Hyderabad 06.01.2021 to 08.01.2021 (Online Mode) ICAR-NRRI, Cuttack 12.01.2021 to 14.01.2021 (Batch-I) (Online Mode) ICAR-NRRI, Cuttack 19.01.2021 to 21.01.2021 (Batch-II)	



6	All Estt Staff	Estt Staff Training on Government eMarket place (GeM)	
7	Smt. Akhila N. R. Shri Shyam Prasad	Workshop on Establishment Rules	(Online Mode) ISTM, New Delhi 01.03.2021 to 05.03.2021
8	Shri Sabukuttan K. B.Orientation Training Programme on Preventive Vigilance for Group A & B Officers		(Online Mode) ISTM, New Delhi 29.03.2021 to 30.03.2021.
9	Shri Sreekumaran. K. S Smt. Febeena P. A. Training programme on Budget Utilisation Procedure for Administrative & Finance Officers of ICAR		(Online Mode) ICAR-NAARM, Hyderabad 22.07.2021 to 24.07.2021
10	0Smt. Renuka K. Smt. Surya G.Training programme on Accrual Accounting for Administrative and Finance Staff of ICAR Institutes/ HQs (Batch-III).		(Online Mode) ICAR-NRRI 26.07.2021 to 30.07.2021
11	Shri P. G. David	Training programme on Assets Management for Administrative and Finance Staff dealing with Assets Management	(Online Mode) ICAR-IARI 06.10.2021 to 08.10.2021
12	Shri Sabukuattan. K. B.	Training Programme on Pension and other Retirements Benefits (GRB2-14)	ISTM, New Delhi 18.10.2021 to 22.10.20221
13	Smt. K.V. Suseela	Training Programme on Establishment Matters for LDCs and UDCs (Batch-II).	ICAR-IISR, Lucknow 15.11.2021 to 20.11.2021
14	Shri Avinash Agawane Smt. Bhavyamol C. G.	Government e Marketplace (GeM) training organized by ICAR-CIFT, Cochin	(Online Mode) 20.12.2021
15	Smt. Nalla Naveena	Government eMarket place (GeM) training	ICAR-CIFT, Kochi 21.12.2021
16	Shri Vinodh Kumar M N	Orientation Training Programme on "Preventive Vigilance" for Group A & B Officers	(Online Mode) ISTM New Delhi 27.12.2021.

Zonal Technology Management & Agribusiness Incubation Centre

The Zonal Technology Management and Agribusiness Incubation (ZTM-ABI) Centre at ICAR-CIFT acts as a platform for the speedy commercialization of the technologies and reinforcing of public private partnerships, through an interfacing and networking mechanism between R&D institutes, industries and financial institutions. The Centres supports the growth of competitive enterprises in the fisheries sector by advancing innovation in products, processes, and business models. This entrepreneurial support system handholds entrepreneurs and pro-active and value-added business services are provided to registered incubatees in the form of technology transfer, contract research, consultancy, contract service, office space, certified state-of-the-art pilot level production facility, on-site guidance and specialized trainings to establish technology-based business enterprises. The Centre possess multi-tenant infrastructure facilities suitable to start a corporate level office for direct incubatees, within the premises of the Institute. Direct incubation is intended to handhold clients during their infancy period. Business Meets and industryinterface programmes are regularly conducted for sensitizing entrepreneurs, and identified candidates with viable business ideas are selected for incubation. Registered incubatees are allowed to meet scientists and business associates whenever required to optimize product formulation and identify suitable business strategies.

ACHIEVEMENTS DURING JANUARY – DECEMBER 2021 📗

Signed 27 technology transfer agreements and 20 professional service functions

ICAR-CIFT has developed a wide range of technologies in areas of energy efficient fishing vessels, gear designs, processing / preservation techniques, smart packaging techniques, value added products / by-products, cost effective food processing machineries, health care / aquaceuticals products etc. The list of technology commercialisation projects taken up during the year 2021 is given below.

Category of commercialization	No.
Technology Transfer	27
Consultancy Projects	11
Contract Service	5
Contract Research (Grant-in-Aid / sponsored / collaborative)	4



Category of technology transfer agreements signed in various areas



A total of 10 entrepreneurs registered at ZTM-ABI Centre for business incubation

The clientele of ZTM-ABI Centre includes young start-up firms who are in need of basic level technology support and training, to high-end business firms in need of R&D back up for development of diversified products. The clients who registered at the centre during the year 2021, for various technologies are given below:

S. No.	Name of the incubatee / entrepreneur	Technology support
1.	Mr. Jayasurya T. R., M/s Source Factory, Ernakulam	Dry fish processing
2.	Mr. Adithye Joseph, Kochi	Production of various types of meat sausages
3.	M/s Evergreen Organic Agro Farm Products, Mr. Radhakrishnan N. & Mrs. Bindu S., Kochi	Chilling and packaging fresh fish in ready to cook form
4.	Mr. Pothen Thomas, One India Farms and Plantation, Kalamassery, Kochi	Chilling and packaging fresh fish in ready to cook form
5.	Mr. Prajeeth Menon, Aluva	Fish Feed Production
6.	Mrs. Shije Varghese, Eramallur	Mushroom based energy drink
7.	Ms. Sethulakshmi C.S., Dhi Research Solutions	Data consultancy services in fisheries sector
8.	Mr. Tojo G. Tharayil, DRP Molecules Pvt. Ltd., Ernakulam	Manufacture of molecular biology reagents, microbiology reagents,
9.	Mr. Justin Lopez, Trivandrum	Dry fish and Fresh fish
10.	Prime Harvest, Mr. Sathyan K.B., Kochi	Chilling and packaging fresh fish in ready-to- cook form



The Incubation Centre possesses good infrastructure facilities suitable for providing direct incubation of about 9 entrepreneurs in a corporate environment within the premises of ICAR-CIFT, at a time. During 2021, three new clients started their commercial activities using the Incubation Office Facility.

- 1. Kerala State Coastal Area Development Corporation (KSCADC)
- 2. Prime Harvest, Chellanam, Kochi
- 3. Dhi Research Solutions, Kochi

ICAR-CIFT Incubatees received recognition from DPIIT, Ministry of Commerce and Industry, Govt. of India

Two firms registered at ZTM-ABI Centre at ICAR-CIFT, M/s Foo Foods India Private Limited, Kozhikode and One India Farms and Plantations Pvt. Ltd, Ernakulam received recognition as Startups, from Department of Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Govt. of India.

Foo Foods India Private Limited, Kozhikode



One India Farms and Plantations Pvt. Ltd, Ernakulam



Manufacture and supply of ICAR-CIFT designed machineries to Clients through empanelled agencies

The Centre has facilitated the manufacture and supply of 19 ICAR-CIFT dryers, 24 refrigerated vending kiosks and 29 descaling machines through the empanelled agencies to various clients.



S. No:	Details of client	No: of Units / Capacity			
	WALK-IN TYPE SOLAR TUNNEL DRYER				
1.	Borlaug Institute for South Asia (BISA), New Delhi	10 units, (50 kg capacity)			
2.	M/s Galilee Fish, Kollam, Kerala	1 unit, (50 kg capacity)			
3.	Krishi Vigyan Kendra (ICAR), Kumarakom, Kottayam, Kerala	1 unit, (50 kg capacity)			
	SOLAR HYBRID DRYER				
4.	G.B. Pant University of Agriculture and Technology, Uttarakhand	Solar Electrical Hybrid Dryer (20 kg capacity) – 1 unit			
5.	CISH, KVK, West Bengal	Solar Electrical Hybrid Dryer (20 kg capacity) – 1 unit			
6.	College of Fisheries, Chhattisgarh	Solar Electrical Hybrid Dryer (20 kg capacity) – 1 unit			
7.	Sri Teja Foods Narasinga Rao,	Solar Electrical Hybrid Dryer (20 kg capacity) – 1 unit			
8.	Anand Traders Mr. Binoj, Kalady, Kerala	Solar Electrical Hybrid Dryer (40 kg capacity) – 1 unit			
9.	Olive Theological Society Thiruvalla, Kerala	Solar Electrical Hybrid Dryer (20 kg capacity) – 1 unit			
10.	Olive Theological Society Thiruvalla, Kerala	Electrical dryer (10 kg capacity) – 1 unit			
11.	NETFISH (MPEDA) Kolkata	Solar LPG Hybrid Dryer (60 kg capacity) – 1 unit			
12.	Shree Sanjeevani Grama Panchayat Uttara Kannada	Solar Electrical Hybrid Dryer (40 kg capacity) – 1 unit			
13.	MATSYAFED Kottayam, Kerala	Solar Electrical Hybrid Dryer (20 kg capacity) – 5 units			
14.	Mr. Sajeevan Nayarambalam, Kochi	Solar Electrical Hybrid Dryer (20 kg capacity) – 1 unit			
15.	VCAN Agro Foods Maharashtra	Solar LPG Hybrid Dryer (100 kg capacity) – 1 unit			
16.	Mr. Lijo K.V. Thrissur, Kerala	Solar Electrical Hybrid Dryer (20 kg capacity) – 1 unit			
17.	Elba Exports Thrissur, Kerala	Solar LPG Hybrid Dryer (300 kg capacity) – 1 unit			
18.	Ms. Ranjini E. Ernakulam, Kerala	Solar LPG Hybrid Dryer (100 kg capacity) – 1 unit			



19.	Source Factory Aluva, Kerala	Solar LPG Hybrid Dryer (100 kg capacity) – 1 unit		
REF	RIGERATED MOBILE FISH VENDING KIOSK			
20.	Fisherwomen Activity Groups in Kerala, Society for Assistance to Fisherwomen (SAF), Fisheries Department, Government of Kerala	10 units		
21.	Fisherwomen Activity Groups in Kerala, through CSR Initiative of Cochin Shipyard Ltd.	14 units		
HAN	HAND-OPERATED FISH DESCALING MACHINE			
22.	Fisherwomen Activity Groups in Kerala, Society for Assistance to Fisherwomen (SAF), Department of Fisheries, Govt. of Kerala	10 units		
23.	Fisherwomen Activity Groups in Kerala, CSR Project of Cochin Shipyard Limited	14 units		
24.	Indira Gandhi Krishi Vishwavidyalaya, KVK, Raipur	4 units		
25.	Odisha University Of Agriculture & Technology, Odisha	1 units		

Intellectual Property Rights

The ZTM-ABI Centre facilitated the filing of following IPRs for ICAR-CIFT.

IPR CATEGORY	S. No:	TITLE	INNOVATORS/ AUTHORS/ CONTRIBUTORS	STATUS
PATENTS	1	Enteric Methane Reduction Using Biowaste of Padina Gymnospora Obtained After Supercritical Fluid Extraction (Joint Patent – NIANP & CIFT) Patent Application No. 202111051271 Filing date: 09/11/2021	 Dr. Pradeep Kumar Malik Dr. Atul Purushottam Kolte Dr. Tejpal C.S. Dr. Elavarasan K. Dr. Ravishankar C.N. Dr. Raghavendra Bhatta 	Application filed
	2	Nutraceutical Composition of Capparis Spinosa and Process of Preparation thereof (Joint Patent – CIFT & Ishka Farms) Patent Application No.202141039372 Filing date: 31/08/2021	 Dr. Niladri Sekhar Chatterjee Dr. Suseela Mathew 	Application filed



COPYRIGHT	3	Customised Database on Shrimp Processing Waste from Organised Shrimp Processing Sector in India Diary No:18664/2021-CO/SW Date of Application: 08/08/2021	 Dr. Joshy C.G. Smt. Lizbeth Roshin, Dr. Zynudheen A. A. Dr. Elavarasan K. Dr. George Ninan Dr. Ashok Kumar K. Dr. Ravishankar C.N. 	Application filed
	4	Web Based Information System on Value Added Fish Byproducts Registration No: SW- 14992/2021 Date of Application: 08/08/2021	 Dr. Joshy C.G. Dr. Elavarasan K. Dr. Zynudheen A. A. Smt. Shyla N.C. Dr. George Ninan Dr. Ashok Kumar K. Dr. Ravishankar C.N. 	Registered
INDUSTRIAL DESIGNS	5	Hot Air Assisted Continuous Infrared Dryer Design No: 341136-001 Class: 15-99 Application Date: 20/03/2021	 Dr. D.S. Aniesrani Delfiya Dr. Manoj P. Samuel Shri Prashob K. Dr. Murali S. Smt. Alfiya P.V Dr. Ravishankar C.N. 	Registered
	6	Fish Smoking Kiln Application No. 341580-001 Class: 31 Application Date: 27/03/2021	1. Dr. M.M. Prasad	Application filed
	7	V-Form Double Slotted Otter Board Application No. 350714-001 Class:22-05 Application Date: 05/10/2021	1. Dr. M. P. Remesan 2. Shri Benny O.D.	Application filed

Conducting Institute Technology Management Committee meetings

Two ITMC Meetings were held on 28th January and 22nd November 2021, to discuss regarding various commercialisation activities and IPR protection. During the meetings 6 patent proposals, 3 industrial designs and 3 copyrights were reviewed and approved for filing.





Mr. M.V Baiju, Senior Scientist, Fishing Technology Division of ICAR-CIFT, Kochi was awarded PhD. for the thesis "Optimisation of hull of a fuelefficient deep sea multipurpose fishing vessel using Computational Fluid Dynamics" from the Cochin University of Science and Technology (CUSAT), Kochi, under the guidance of Prof. K. Sivaprasad, Department of Ship Technology, CUSAT.

Ms. Laly. S. J., Scientist, Quality Assurance and Management Division, ICAR-CIFT, Kochi was awarded PhD. for the thesis "Screening & characterization of allergens in selected shrimp species and its stability under different processing conditions" from the Cochin University of Science and Technology (CUSAT), Kochi, under the guidance of Dr. T. V. Sankar, Principal Scientist, ICAR-CIFT, Cochin

Mr. V. Chandrasekar, Scientist, Extention , Information and Statistics Division, ICAR-CIFT, Kochi was awarded PhD. for the thesis "Economic valuation of Vembanad Estuarine Ecosystem of Kerala in Relation to Fisheries" from the Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu, under the guidance of Dr.Murali Gopal, Professor (Retd.), Dept of Economics TNAU, Coimbatore. Dr.Nikita Gopal, Principal scientist, EIS Division, ICAR-CIFT, Kochi was the Co-Guide

Mr. Tejpal C. S. Scientist, Biochemistry and Nutrition Division, ICAR-CIFT, Kochi was awarded PhD. for the thesis "Synthesis, characterization and assessment of bioactivity of vitamins loaded phenolic acid grafted chitosan micro-particles" from the Cochin University of Science and Technology (CUSAT), Kochi under the guidance of Dr. Suseela Mathew, Principal Scientist & Head of Division, Biochemistry and Nutrition Division, ICAR-CIFT, Cochin



Tejpal C.S.





Baiju M.V.

Chandrasekar V.



PhD. _____





Mr. Renjth Kumar Nedalla, Scientist, Quality Assurance and Management Division, ICAR-CIFT, Kochi was awarded PhD. for the thesis "Studies on integron and transposon mediated transfer of antibiotic resistance genes in bacteria from shrimp culture system and their mitigation" from the ICAR-Central Institute of Fisheries Education, Mumbai under the guidance of Dr. M.M. Prasad, Principal Scientist & Head (Retd.), MFB Division, ICAR-CIFT, Kochi.



Mr. Sreejith V. N., Technical Assistant, Microbiology, Fermentation and Biotechnology Division, ICAR-CIFT, Kochi was awarded Ph D. for the thesis "Distribution, genetic characterization and antimicrobial resistance profile of pathogenic Vibrio parahaemolyticus from retail markets and aquaculture farms in Kerala (India)" from the Cochin University of Science and Technology, Kochi, under the guidance of Dr. K. V. Lalitha, Principal Scientist and HOD (Retd.) & Dr. Toms C. Joseph, Principal Scientist and HOD, MFB Division, ICAR-CIFT, Kochi was the Co-guide



Ms. Reethy P. S., Senior Research Fellow, Microbiology, Fermentation and Biotechnology Division, ICAR-CIFT, Kochi was awarded Ph D. for the thesis "Ecology and Genetic Diversity of Vibrio cholerae in Seafood and Aquatic Environment" from the Cochin University of Science and Technology, Kochi, under the guidance of Dr. K. V. Lalitha, Principal Scientist and HOD (Retd.), MFB Division, ICAR-CIFT, Kochi.







Awards and Recognitions



Dr. Suseela Mathew, Principal Scientist and Head (i/c) Biochemistry & Nutrition received NAAS fellowship (Fisheries Science) for the year 2021.

Dr. C.O. Mohan, Senior Scientist, Fish Processing Division received Best Fisheries Scientist Award 2021 in connection with the 5th International Conference on "Advances in Agriculture, Environmental and Biosciences for Sustainable Development" (AAEBSD-2021), organized by Agro Environmental Development Society (AEDS), Rampur, U.P., India.





Dr. Remya S., Scientist Quality Assurance and Management Division received 'Young Scientist Award in Fisheries Science' declared in connection with the 5th International Conference on "Advances in Agriculture, Environmental and Biosciences for Sustainable Development" (AAEBSD-2021), organized by Agro Environmental Development Society (AEDS), Rampur, U.P., India.

Dr. A. Jeyakumari, Scientist, Fish processing received Young Scientist Award on the occasion of International web conference on Global Research Initiatives for sustainable Agriculture and allied sciences on 13-15th December, 2021 organized by Society for scientific development in Agriculture and Technology, Meerut, U.P. under the research area of Post-Harvest Technology





Dr. A. K. Mohanty, Principal Scientist and Head, Extension, Information and Statistics Division conferred with IAHF Fellow Award, 2018 by Indian Association of Hill Farming, Umiam, Meghalaya during November, 2021



Dr. Nikita Gopal, Principal Scientist, Extension information and statistics received Certificates of appreciation from organizers of Sixth Joint International Conference for Fisheries and Aquatic Sciences (ICFAS6) and Asian Fisheries Social Science Research Network Forum 1 (AFSSRN F1) for being Member, International Organizing Committee, Panelist, Session Chair and paper presentation

Dr. Murugadas V., and Team received letter of appreciation for the protocol Multi-host enrichment for harnessing broad host spectrum lytic phages from College of Food Technology, KVASU, Kerala on 08 February 2021. The protocol was compared in laboratory and proven to improve the isolation of a greater number of phages with broad host range.

Dr. Murugadas V., Scientist, Microbiology, Fermentation and Biotechnology Division - NABL assessor for biological parameters in food.

Dr. Remya S., Scientist Quality Assurance and Management Division received INSA Visiting Scientist Fellowship (FY 2021-2022) by Indian National Science Academy, New Delhi.

Dr. Remya S., Scientist Quality Assurance and Management Division bagged 'ISCAR Best Paper Presentation Award for Early Career Researcher' for presentation of the paper entitled "Development of Chitosan Based Novel Antioxidant Film for Fish Packaging Application" by S. Remya, C.O. Mohan, J. Bindu and C.N. Ravishankar in the International Symposium on Coastal Agriculture (ISCA Webinar): Transforming Coastal Zone for Sustainable Food and Income Security organized by Indian Society of Coastal Agricultural Research, West Bengal in virtual mode during March 16-19, 2021.

Dr. C.O. Mohan, Senior Scientist, Fish Processing Division received Best Oral Presentation award for Effect of intrinsic properties of Chitosan on the antimicrobial and physical properties of biodegradable chitosan film and its application for packing Horse mackerel authored by Mohan, C.O., Remya, S., Sreelakshmi, K.R., Elavarasan, K., Bindu, J. and Ravishankar, C. N. in the 5th International Conference on "Advances in Agriculture, Environmental and Biosciences for Sustainable Development (AAEBSD-2021)", held during 5-7th August, 2021 virtually.

Dr. P.K. Binsi, Senior Scientist, Fish Processing Division received Best Oral Presentation award in the International Web Conference (ICAAAS 2021) on the paper 'Bioactive and Cytotoxic Properties of Astaxanthin-shrimp head oil complex' held during July 19-21, 2021.

Dr. G. K. Sivaraman, Principal Scientist, Microbiology, Fermentation and Biotechnology Division received Best Poster presentation Award for the paper entitled Virulence genes and antimicrobial resistance in non- typhoidal Salmonella serovars isolated from pigs of the central Karnataka region, India, by Nagappa K, Satheesha S.P, Archana S Nair, Manjushree T.R, Girish Patil S & G. K. Sivaraman. In: International Webinar: Eco health Paradigm: Towards Sustainability and Global Health, Organized by KVASU, Pookode, Wayanad Kerala on 03-04th Aug 2021.

Dr. P.K. Binsi, Senior Scientist, Fish Processing Division received Best poster Award for the paper entitled "Photo-Protective Effect of Cuttlefish Ink Melanin on Human Hair by P. K. Binsi, P. Muhamed Ashraf, U. Parvathy and A. A. Zynudheen" presented in the poster session of the International Symposium on Coastal Agriculture (ISCA Webinar): Transforming Coastal Zone for Sustainable Food and Income Security organized in virtual mode during March 16-19th, 2021.



Dr. Manju Lekshmi N., Scientist, Fishing Technology Division received best presentation award for "Eco-friendly wood preservation for low cost boat building timbers" international webinar on Sustainable marine fisheries and aquaculture policies, packages and perspectives in blue economy paradigm (SMART P3BLUEECO-2021), during 12th-13th March 2021 organised by University of Kerala, Department of aquatic biology and fisheries supported by Shastri Indo-Canadian Institute.

Dr. Parvathy U., Scientist, Fish Processing Division received the best oral presentation award for the paper entitled "Comparative evaluation of the properties of collagen peptide extracted from dolphin fish bone by conventional and microwave protocols" in the Online conference on "Innovative and Current Advances in Agriculture and Allied Sciences (ICAAAS-2021)" from 19–21 July, 2021 by Society for scientific development in Agriculture and Technology, Meerut (U.P.).

Dr. A. Jeyakumari, Scientist, Fish Processing Division received Best Oral Presentation Award for the paper on "Effect of chitosan /clove essential oil on shelf life of restructured product from Nile Tilapia (Oreochromis niloticus) authored by Jeyakumari A, Binsi P.K, Laly S J, Narasimha Murthy L in the Ninth edition of the National Symposium on "Chitin and Chitosan (9th-ICCSS-2021)" held during 26 – 28 February 2021.

Dr. A. Jeyakumari, Scientist, Fish Processing Division received has been awarded with first prize for oral presentation in 9th-Indian Chitin & Chitosan Society Symposium (ICCSS)-2021 from 26th to 28th February 2021 for the research paper presented on "Effect of chitosan /clove essential oil on shelf life of restructured product from Nile Tilapia (*Oreochromis niloticus*)".

Dr. S. Murali, received the first prize for the oral presentation on 'Development and performance evaluation of an unglazed photo-voltaic-thermal (PVT) system using water and nanofluid cooling medium' in the International Conference on Emerging Green Energy Technologies and Environmental Sustainability (ECOFEST '21) organized by TNAU, Coimbatore on 20th December 2021.

Smt. Yasmi V. S., Researcher, Fishing Technology Division received best presentation award for "Global Warming Potential of Mechanized fishing systems in India: Analysis using Life Cycle Assessment approach" in international webinar on Sustainable marine fisheries and aquaculture policies, packages and perspectives in blue economy paradigm (SMART P3BLUEECO-2021), during 12th-13th March 2021 organised by University of Kerala, Department of aquatic biology and fisheries supported by Shastri Indo-Canadian Institute.

Shri Muneeb K.H., Researcher, Microbiology, Fermentation and Biotechnology Division received Best Poster presentation Award for the paper entitled Understanding the molecular epidemiology of Methicillin- resistant Staphylococcus aureus (MRSA) in fishery environment by Muneeb K.H, Sudha S, G. K. Sivaraman, Bibek Shome, Jennifer Cole, Mark A Holmes. In: International Webinar: Eco health Paradigm: Towards Sustainability and Global Health, Organized by KVASU, Pookode, Wayanad Kerala on 03-04th Aug 2021.



Priority setting, Monitoring and Evaluation (PME) Cell

The Priority setting, Monitoring and Evaluation (PME) Cell of ICAR-CIFT functioned during the year 2021, primarily with the following objectives.

Priority setting, Monitoring and Evaluation of Institute Research Projects

The PME Cell monitored and evaluated the research projects in the identified research priorities of the Institute and evaluated the projects twice in the year through conduct of meetings of Project Monitoring and Evaluation Committee of the Institute. The projects initiated during April 2021 and those completed by March 2021 were evaluated and graded. RPP I, RPP II and RPP III of 25 ongoing Institute projects including short term projects on innovative areas from young scientists on a competitive mode and 6 concluded projects were processed.

Externally funded projects

A total of 13 proposals for external funding were routed through the Cell after ascertaining that they fall under the mandate and priority research areas of the Institute.

Submission of Monthly, Quarterly and Half yearly Reports

Monthly reports on the important activities of the Institute and significant research findings were compiled and sent to ICAR regularly for inclusion in the ICAR monthly report to the Cabinet Secretariat//PMOs Office. Quarterly and six-monthly reports on the targets and achievements of the Institute comprising both research and financial aspects were regularly furnished to the Council. Inputs requested from the council on various points were collected, processed as per the formats given and submitted to the council from time to time. Other kind of weekly, monthly reports were also furnished as per instructions provided. Reports to DARE/ICAR like DARE Report, ICAR Reporter, ICAR News etc. were also furnished.

Institute Research Council: The Institute Research Council meeting was convened during 22, 23 and 26th April 2021, virtually to review the progress achieved in the ongoing research projects of the Institute during 2020-21 and to discuss the research project proposals for the year 2021-22. The Institute Research Project Document for the year 2021-22 was compiled and brought out for discussion at the meeting. The house discussed in detail the 25 ongoing research projects, 6 completed projects and 4 new projects.

Verification of CAS Reports of Scientists: The PME Cell verified and scrutinized Career Advance Scheme Reports submitted by 37 institute scientists for their promotion and the reports submitted to the Director.



Participation of Staff/ Research Fellows in Conference/Seminar/Symposia: The PME Cell monitored & ensured the participation of staff members and other research scholars in various conferences/seminars/symposia as per the mandate of the Institute and theme of the programmes. During the year virtual mode of participation was promoted in such events.

Publication of the Scientific Papers and maintenance of database:

The cell facilitated processing and approval for about 200 publications of/from the Institute viz., research papers, popular articles, books, brochures, leaflets, pamphlets, seminar/conference abstracts etc. The research papers and popular/technical articles meant for publication in journals and for presentation in Symposia/Seminars were arranged for review and for plagiarism clearance and recommended for decision/approval by Director.

Parliament/Lok Sabha questions/Requests

The Cell arranged to give replies to the Lok Sabha/Rajya Sabha questions/requests from MP/MLA/ Minster etc. on priority basis.

Database on all ICAR funded and externally funded projects (completed and on-going), publications, technologies developed, patents, consultancies.

The cell maintained database of projects and publications of the Institute viz., research papers, popular articles, books, brochures, leaflets, pamphlets, seminar/conference abstracts etc.

Knowledge Management activities of the Institute

The PME cell facilitated the Knowledge Management activities of the Institute. Publications, technologies, data etc. were uploaded in the KRISHI portal of ICAR and updated regularly.

Organization of India @ 75: Bharat Ki Azadi Ka Amrut Mahotsav (AKAM) DARE/ICAR Campaigns with Time line

The Cell has organized various events on the themes of National Campaigns proposed by the SMD to commemorate India's 75th year of freedom. The following programmes were organized on the responsibility of the Institute as assigned, and as well jointly with other fisheries Institutes. The details are given in pages 177-183.

Other Technical Matters: The Cell continued to answer queries on various technical matters received from other organizations and individuals. The queries received by the PME Cell in, as well as from the feedback option in the Institute website were attended to. Further, materials for various publications like ICAR News/ICAR Reporter, Agrinews, Fishing Chimes, MPEDA Newsletter, Seafood News, Aqua International, Sea Queen, ICAR Web page etc. were forwarded regularly for publication.

The publicity related and extension-oriented activities of the Institute are being regularly presented in the monthly meetings of the Inter Media Publicity Co-ordination Committee of Ministry of Information and Broadcasting, Govt. of India.



Agricultural Knowledge Management Unit (AKMU) ICAR-CIFT, Cochin

Agricultural Knowledge Management Unit (AKMU) caters to meet the ICT needs of the institute by providing and maintaining the Internet, Email, Video Conferencing and other computer related facilities. AKMU provides internet connectivity to nearly 300 systems through LAN and wifi connectivity to nearly 250 users. ICAR-CIFT is presently connected with 1000 mbps lease line under National Knowledge Network (NKN) provided by Govt. of India and 20 mbps ILL from BSNL to provide all the ICT services around the clock for the employees of the Institute. Local Area Networking (LAN) was managed by AKMU.

AKMU properly manages ICAR-CIFT Website and it is available in the url https://cift.res.in/ . It highlights overall research activities and achievements of the institute and act as an interface between institute and end users. The contents of the Institute website are periodically updated. The information on training programmes, recruitments of temporary staff, tender notices and other circulars of the institute are periodically uploading in the Institute Website to the transparency of the working condition. This unit is managing online meetings in different platforms like google meet, webex and zoom. These facilities are being used for monitoring and evaluating research programmes in the Research Centers of the institute and also other organizations. AKMU manages institute's official social media accounts like facebook, twitter and whatsapp for disseminating institute's technologies and activities to the public.

AKMU gives real time reply to queries received from farmers, students, entrepreneurs, researchers and others in the agricultural and allied sectors to e-Krishi Manch, a public interface platform developed by ICAR for stakeholders. AKMU also provides input to KM Portal developed by ICAR by updating details of institute higher authorities contact information, sophisticated analytical instrumentation facility and financial transaction details of the institute.

Assist in successfully implementing ICAR MIS & FMS and e-office in the institute by providing technical and training support, another important activity of AKMU. AEBAS system for attendance of staff is also maintained by AKMU. Verifying and certifying quality of information technology equipments purchased is being managed by this unit. AKMU provides K7 Enterprise Security through the server for protecting from malware threats and other external sources of threats, thus improving the ICT efficiency. It also acts as a gateway to protect from intrusion attacks to prevent the leakage of confidential data by adding 250 clients in the system.

Official Language Implementation

The Official Language cell of ICAR- CIFT is contributing towards the compliance of Official Language policy Implementation in the Headquarters' and its Regional Research Centre's as per the guidelines of Official Language Department, Ministry of Home Affairs, Government of India. The key concepts of the Official Language Implementation like Bilingual maintenance of section 3 (3) documents, Noting and Drafting in Hindi in E office, Maintenance of the Official Language Roster of the organization and thus enabling Hindi Training and granting incentive awards to the employees for doing their original work in Hindi, establishing check points etc. are being implemented from time to time. Apart from this, the Official Language section is putting all practical and creative efforts for Official Language Implementation in the Institute.

Vishwa Hindi Diwas celebrated in the Institute



Release of book by Director on Vishwa Hindi Diwas

Vishwa Hindi Diwas was celebrated with enthusiasm under the chairmanship of Dr. Ravishankar C.N., Director on January 11, 2021 at the ICAR-CIFT. All the scientists/officers and employees of Central Institute of Fisheries Technology, Kochi, Headquarters were present in this programme of official language. The scientists in-charge of the Institute's Research Center, Veraval, Mumbai, Visakhapatnam and officials associated with the official language also participated through the virtual medium.



Underlining the practical implementation of the Official Language, in his resolute address, Director urged everyone to cooperate in the compliance of the Official Language. He also mentioned the official language activities implemented at Research Centre of Institute, Visakhapatnam, Veraval and Mumbai.

On the occasion of Vishwa Hindi Diwas, 'Kaaryaalay Nipunata' (Bilingual Edition) was released by the Director, and copies were distributed to all the Divisions/Sections and Research Centers of the Institute.

Hindi Week Celebrations 2021

Hindi Week celebrations 2021 was conducted during 14-23 September 2021. Various practical Hindi Implementation programs were organized during the Hindi week like award for originally working in Hindi, Hindi Workshop, distribution of office noting and drafting book, distribution of office orders to proficient employees and Hindi week concluding ceremony was celebrated on 23rd September 2021 at the Institute. On this occasion, the Director distributed certificates to the winners of the incentive scheme, namely Shri Subeesh S.S., Lower Division Clerk, Kum. Archana N., Lower Division Clerk and Smt. Subin George, Upper Division Clerk.



Winners of the Incentive Scheme along with Director and Deputy Director (OL)

Hindi Workshops

Official language workshop of administrative staff on 'Usage of Hindi in administrative work' was organized on 23 January 2021. Upper and Lower Division Clerks of the Institute participated in it. This workshop was organized by Dr. P. Shankar, Assistant Chief Technical Officer on compliance official work in Hindi regularly as per guidelines of the Official Language Rules, 1976. The workshop started with the opening remarks of Dr. J. Renuka, Deputy Director (Official Language).





Hindi workshop in live on 'Usage of Hindi in Administrative works'

Workshop on Hindi Terminology

An online Hindi workshop on Hindi Terminology for technical officers/staff of the institute was organized by Dr. Santosh Alex, Assistant Chief Technical Officer on 16th September, 2021.

Regional Online Hindi Workshop on 'Role of Scientists' in Official Language Implementation'

Another online Hindi workshop was organized on 4 October 2021 for the scientists of the Institute's Headquarters, Cochin and all the three Research Centers i.e., Visakhapatnam, Veraval and Mumbai on the topic 'Role of Scientists in Official Language Implementation'. A total of 25 scientists participated in this Regional Hindi Workshop from their respective places and its faculty support was provided by Smt. Gargi Gadgil, Hindi Praadhyaapak, Central Hindi Training Institute, Mumbai, Maharashtra.



Online Hindi workshop by Smt. Gargi Gadgil



Participation in inspections of committee of Parliament

Dr. Ravishankar C.N., Director, ICAR-CIFT and Dr. J. Renuka, Deputy Director (Official Language) attended inspection of Veraval Research Centre of ICAR-CIFT, Veraval by the second subcommittee of committee of Parliament on Official Language at Diu on 27 August 2021.



Inspection by the second subcommittee of committee of Parliament on Official Language

Faculty support for other organizations by Deputy Director (Official Language)

Dr. J. Renuka, Deputy Director (Official Language) organized a one-day workshop on December 24, 2021, on the topic of '*Raajabhaasha Kaaryaanvayan ka Suchaaru Sanchaalan evan Yuktiyaan*' at ICAR-Indian Institute of Millets Research, Rajendranagar, Hyderabad.



Library

Library plays a vital role in providing services to support the information needs of the scientific community of the Institute. Apart from strengthening collection, the focus of this year was to implement latest information services.

Library literature assets

The total number of books in the collection has gone up to 012888 volumes this year. Online databases viz., ASFA (Aquatic Science and Fisheries Abstracts) and Indian Standards have also been subscribed during the year.

Koha Library Management System

The Library is using KOHA Library Management Software. The Online Public Access Catalogue (OPAC) enables users to search the library collection and guides them to precise locations.

Digital Repository of CIFT

Digitization of CIFT publications and putting them in open digital repository is an important activity of the library. During the period, 805 documents have been digitized and added to the repository. At present CIFT Digital Repository holds 5056 digital documents.

Mobile/ Web App

Due to the Covid-19 pandemic, physical access to library is partially restricted to the clientele. To overcome this situation, MyLOFT mobile/web app has been introduced to facilitate remote access to library subscribed premium e-resources.

CeRA (Consortium of e-Resources on Agriculture)

More than 2000 online journals are available through CeRA (Consortium of e-Resources on Agriculture). Library has supplied copies of 42 articles under DDR (Document Delivery Request) facility of CeRA (Consortium of e-Resources on Aquaculture) to the member libraries.

Institutional Membership

CIFT library is a member of IAMSLIC (The International Association of Aquatic and Marine Science Libraries and Information Centers) and is part of the Interlibrary Loan program, with more than 90 member libraries from more than 25 countries offering materials to other member libraries via interlibrary loan and document delivery.



The Library is also an institutional member of DELNET-Developing Library Network, which coordinates with other regional, national and international networks and libraries for exchange of information and documents.

CIFT Library had become an Institutional member of Current Science Association from September 2016 onwards

ASFA Input Centre

The library in association with NIO, Goa continued to act as a National Input Centre of ASFA (Aquatic science and Fisheries Abstracts) database.

National Digital Library of India (NDLI) Partner

Content of CIFT Digital Repository is available through National Digital Library of India (NDLI)






ISO 17025 : 2017 Activities

ICAR- CIFT laboratories are accredited to ISO/IEC 17025: 2005 by NABL in the field of Chemical, Mechanical and Biological testing since the year 2005. Dr. A. A. Zynudheen, Principal Scientist and HODin-Charge, Quality Assurance and Management Division serves as the Quality Manager and Dr. Satyen Kumar Panda, Principal Scientist as the Technical Manager of NABL in the institute. NABL Cell with Smt. P.K. Shyma (ACTO, Engineering Division), Smt. N.C. Shyla (Technical Officer, AKMU), Shri. Rahul Ravindran (Technical Assistant, FP Division), Shri. G. Vinod (Sr. Technician, FP Division) and Shri. Ajith Chellappan (Sr. Technician, QAM Division) as members is constituted for the smooth functioning of the NABL activities in the institute.

Integrated assessment of the testing laboratories of ICAR-CIFT as per ISO/IEC 17025: 2017 and FSSAI were conducted by National Accreditation Board for Laboratories, New Delhi during 17-21, November 2021. The validity of accreditation of laboratories was renewed up to 14 December 2023. Total recommended scope of accreditation for testing is 380 parameters, which includes testing of 309 Chemical parameters, 62 Biological parameters and 09 Mechanical parameters. The National Referral Laboratory facility in ICAR-CIFT, Kochi is also accredited as per ISO/IEC 17025: 2017. The Laboratories participated in Five Proficiency Test programmes in this year. Inter Laboratory Comparison was also conducted for mechanical parameters for paper& paper boards and plastic materials. The laboratory conducted internal audits at planned intervals to conform the requirements of the management system and documents. Management Review Meeting was conducted as per schedule.

During the year 2021, a total of 1115 samples including 312 NABL samples and 803 Non-NABL samples were analysed and total revenue of Rs. 26.73350 lakhs was realised.



Important Events

AZADI KA AMRIT MAHOTSOV

National Campaign Fisheries Sector: Theme (1): Ecosystem Management for Sustainable Fisheries

At ICAR-CIFT, Cochin

As part of the National campaign on "Ecosystem Management for Sustainable Fisheries," ICAR-CIFT headquarters organized a webinar on the theme "Ecosystem Management for Sustainable Fisheries" on 10 July 2021. The webinar featuring two talks was presented on the topics of "Environmental Impacts of Fishing and Mitigation Strategies" by Dr. Leela Edwin, Principal Scientist and Head of Division (i/c), Fishing Technology Division, and "Fishing Gear Related Interventions for Sustainable Fisheries" by Dr. Madhu, V.R., Principal Scientist, Fishing Technology Division. The two lectures addressed the environmental impacts of fishing, both in terms of energy consumption and bycatch. The interventions of fisheries institutions in ICAR were highlighted, as were the technologies developed by ICAR-CIFT for mitigating several of the impacts that affect fisheries sustainability. The webinar drew about fifty participants from industry, college students enrolled in fisheries-related courses, and members of the general public. Following the lectures, a discussion session was held during which any clarifications sought were thoroughly discussed.

At Visakhapatnam Research Centre

Visakhapatnam RC conducted a webinar on "Harvest and Post-harvest Technological Interventions for Environment Management for Sustainable Fisheries" on 10 July 2021. A total of 46 participants including progressive entrepreneurs, fish business operators, state and central govt. officials, scientists, scholars, students etc. participated in the webinar. Shri, P. Koteswara Rao, Additional Director, Department of Fisheries A.P. and Principal, SIFT, Kakinada inaugurated the webinar and delivered a talk on "Initiatives for sustainable fishery development" highlighting the issues of the fisheries sector of Andhra Pradesh. Dr. U. Sreedhar, Principal Scientist delivered a talk on 'Energy efficient fishing for sustainable fishery" and Dr. B. Madhusudana Rao, Principal Scientist delivered a talk on "Fish by-products: means for sustainable utilization and environmental management" focusing on the importance of fish by-products and highlighted the need for zero waste fish processing.



At Veraval Research Centre

Veraval RC of ICAR-CIFT in association with KVK Kodinar has organised a webinar on "Secondary Raw Material: A new Avenue in Fisheries Business" on 10th July 2021. Sri. Rajeshbhai Chudasama, Honourable MP of Junagadh was the Chief guest on the programme. In his inaugural address the honourable MP highlighted the hardships encountered by fishers, fish entrepreneurs, and other relevant groups, due to COVID 19, since both the export and domestic businesses were affected and opined that PMMSY will strengthen the sector. He also highlighted the necessity to diversify the seafood sector by using fish waste as a secondary raw material for high-value items to increase fisher income and he lauded the works undertaken by ICAR-CIFT in this regard. Dr. C.N Ravishankar, Director, ICAR-CIFT in his presidential address outlined the different products out of Secondary Raw Material and reiterated the commitment of ICAR-CIFT for bringing the Rest Raw Material to mainstream fisheries Business. Shri. Manash Choudhary, joint advisor, Niti aayog, Shri. Velji Bhai, Masani, Chairman, Gujarat Fisheries Central Co-operative Association, Dr. Sajid Yusaf Jai, Principal and Dean, College of Fisheries Veraval and other participants from Jammu and Kashmir Dr. Gauhar Vilal Vani and Dr. Sabbirdhal attended the program.





Event II

Theme: System diversification in aquaculture. Sub theme: System diversification Integrated Farming (01st September 2021)

At ICAR-CIFT, Cochin

A national webinar on 'System Diversification in Aquaculture: Aquafeed from secondary fishery raw materials' was conducted by ICAR-Central Institute of Fisheries Technology, Cochin on 01st September 2021 in connection with AZADI KA AMRIT MAHOTSAV. Dr. C.N. Ravishankar, Director, ICAR-CIFT in his opening remarks briefed about various products and technology developed by ICAR-CIFT. He also emphasized the need for valorization of secondary raw material for high value products. Dr. Pravin Puthra, ADG (Marine Fisheries), ICAR, New Delhi inaugurated the webinar and he highlighted the need of hygienic practices on fish market and waste handling in domestic market and narrated the scope for utilization of fish waste as secondary raw material for various high value products. He appreciated ICAR-CIFT contribution to the fisheries sector specifically under the Swachhtha Action Plan. Dr. Salin K, Associate Professor, Asian Institute of Technology (AIT) Bangkok, Thailand delivered keynote address on "Challenges and Opportunities in Feeding Fish Using Low-Cost Raw Materials". He appraised the global aquafeed production, elaborated on various alternative feed ingredients such as insect meal, microalgae, seaweed, canola meal, cotton seed meal etc., as a substitute for fish meal. He also pointed out the limitations such as anti-nutritional factors, incomplete nutritional profile (amino acid, fatty acid profiles) and poor digestibility. Dr. Binsi P. K., Scientist, ICAR-CIFT, explained the nutritional significance of secondary raw material and technical issues including handling, transportation of raw materials and safety concern of fish feed developed from secondary raw material. Dr. Zynudheen A. A., Principal Scientist, ICAR-CIFT detailed the technology for direct conversion of domestic fish market waste into aquafeed. He narrated the technological aspects of feed production including the machinery development, economics and feasibility. He also stressed for the need of collaboration with various stakeholders in aquaculture and fish processing industries.

The panel discussion followed included Mr. Mathew Joseph (COO, Fresh To Home, Bangalore), Dr. Vikas (SMS, KVK, Ernakulam), Mr. Jayaraj Rajan (Project Co-ordinator Matsya Bhavan, Department of Fisheries., Govt. of Kerala), Dr, George Ninan (Principal Scientist, ICAR-CIFT) and Dr. Binsi P. K. (Scientist, ICAR-CIFT). The panel discussion was moderated by Dr. Zynudheen AA (Principal Scientist, ICAR-CIFT) as panel members. The webinar was attended by 43 participants including farmers, entrepreneurs and scientists.

At Visakhapatnam

Visakhapatnam Research Centre of ICAR-Central Institute of Fisheries Technology (ICAR-CIFT) organized a webinar on "Value addition of farmed finfish and shellfish: Avenue for augmenting income from diversified aquaculture" through Google Meet.

The objective of the webinar was to promote value addition of aquacultured fishes and development of by products from fish waste. A total of 97 participants including progressive entrepreneurs, fish business operators, state fisheries department officials, central government officials, scientists, scholars,



students etc. participated in the webinar. Dr. C.N. Ravishankar, Director, ICAR-CIFT addressed the participants and encouraged the entrepreneurs to take up the novel technologies developed by ICAR-CIFT. Dr. Jesmi Debbarma, Scientist, Visakhapatnam Research Centre of ICAR-CIFT delivered a technical talk on "Value addition of farmed fin fish and shell fish-prospects and challenges" wherein she stressed the need for system diversification in aquaculture and gave awareness on the various technologies developed by ICAR-CIFT for value addition of farmed fishes including live fish transportation. Dr. Viji P. Scientist, Visakhapatnam Research Centre of ICAR-CIFT delivered a technical talk on "Developing valuable products from processing wastes of aquacultured fishes". Cost effective technologies for converting fish waste into fish feed and development of high value nutraceutical products from fish waste were highlighted in the talk.









Fit India Freedom Run 2.0





The Ministry of Youth Affairs and Sports, Government of India has planned the" Fit India Freedom Run 2.0 to commemorate "Azadi Ka Amrit Mahotsav" from 13th August to 2nd October. As part of this program a 3 km run was conducted on the 24th of September 2021 for the staff of ICAR-CIFT. The venue was the Cochin Port Trust walkway. 46 staff members participated in the run which was flagged off by Dr. Ashok Kumar, Head, Fish Processing Division.



International Year of Millets 2023

On the occasion of International Year of Millets 2023 – a campaign on Poshan Vatika Mahabhiyan and Tree Plantation was organized on ICAR-CIFT, Cochin at headquarters as well as research Centres Veraval, Visakhapatnam and Mumbai on 17 Sept 2021. Dr. C.N.Ravishankar welcomed the stakeholders and staff and highlighted the importance of dietary fibre in millets and need for promoting nutria garden and plantation. The Scientists in-Charges spearheaded the programme at the Research Centres.

On this occasion, a tree plantation campaign was organized and over100 saplings were planted on this occasion in the quarter and office premises and 50 saplings were distributed to stakeholders and visitors at all the three places. In order to popularize the millet utilization and millet products, millet cookies and multi-grain millets jaggery cookies were distributed among the participants for encouraging the millets intake for nutrition and healthy living. In line with the events and the commemoration of the day CIFT Women's Cell organised a discussion on the health benefits of millets was held at the Institute and "Ragi biscuits" were distributed among staff members to mark the occasion.

To mark the day, two Memorandum of Understanding, one on Consultancy with M/s. Samudra Shipyard for design approval of Tuna Fishing Vessel and the other with M/s Keind Marine LLP for transfer of technical know-how for tuna Salad were also signed between the ICAR-CIFT and the Stakeholders. The staff of the institute participate also participated in the Zoom programme organized organised IIMR and listened to the address by the Hon'ble Union Minister of Agriculture and Farmer's Welfare Shri. Narendra Singh Tomar followed by the presentations by the scientists from different organizations.



Distribution of plant sapling to local government official Dr. Maneka Patil, In-Charge, Vashi Health Centre, NMMCin connection with the Celebration of 'Campaign on Nutri-garden & tree plantation' at MRC of ICAR-CIFT



World Antimicrobial Awareness Week

In connection with 35th week celebration (18-14 Nov. 2021) of Bharat Ki Azadi Ka Amrut Mahotsav, coinciding with 'World Antimicrobial Awareness Week' on the National Campaign theme 'Antimicrobial resistance' ICAR CIFT, Cochin organized an International Webinar on AMR. In the technical session, Prof. Stephen Rimmer from University of Bradford gave an elaborate presentation on the use of acrylic and polyurethane hydrogels for combating antimicrobial resistance specifically on pathogens like *Staphylococcus aureus* and *P. aeruginosa*. The second speaker Prof. Xunli Zhang, an expert in the field of Bioengineering and Microsystems and the Director of Chemical Engineering Division of University of Southampton, spoke on microfluidics technology, a cost-effective platform in tackling AMR. Prof. Till Bachmann, University of Edinburgh, expert in point of care detection of infectious diseases and antimicrobial resistance and conducting research at the interface of biomarkers and rapid diagnostics including for COVID-19, presented the topic: AMR diagnostics in aquaculture. Dr. C.N. Ravishankar, Director, ICAR-CIFT in his concluding remarks on the occasion briefed about the contribution of CIFT in tackling AMR and its contribution in AMR research. The webinar was attended by 170 participants from all over the country and abroad representing various Universities and Research Institutes.

Dissemination workshop under the ICAR-FAO collaborative project

ICAR-Central Institute of Fisheries Technology (ICAR-CIFT), Visakhapatnam Research Centre has organized a dissemination workshop on 21st Dec, 2021 under the ICAR-FAO collaborative project entitled Support mitigation of Antimicrobial Resistance (AMR) risk associated with aquaculture in Asia' for the officials of Fisheries Department, Andhra Pradesh to disseminate the observations/findings made under the project and also to sensitize fisheries department officials on the issues related to AMR and its mitigation. Dr J.K.Jena, DDG (Fy), ICAR, New Delhi; Dr Kuldeep Lal, Director, ICAR-NBFGR, Lucknow; Dr C.N. Ravishankar, Director, ICAR-CIFT, Kochi; Dr Gaurav Rathore, Principal Scientist, ICAR-NBFGR, Lucknow, Sri Koteswara Rao, Former principal SIFT, Kakinada were dignitaries participated in the event.



Dissemination workshop at SIFT, Kakinada



Dr Gaurav Rathore, PS and PI of FAO-TCP-AMR project gave a talk on 'Antimicrobial use and antimicrobial resistance in freshwater fish farms of Uttar Pradesh; Dr B. Madhusudana Rao, PS and PI of FAO-TCP-AMR project delivered a talk on 'Aquaculture practices, antimicrobial use in freshwater fish culture of Andhra Pradesh & Steps to mitigate AMR in fisheries. Dr K. Ahamed Basha, Scientist and Co-PI of FAO-TCP-AMR project delivered a talk on 'Antimicrobial Resistance in Freshwater Fish Aquaculture of Andhra Pradesh. A total of 90 participants participated in the programme.

Dissemination programme on AMR at College of Fishery Science, Muthukur

ICAR-Central Institute of Fisheries Technology (ICAR-CIFT), Visakhapatnam Research Centre organized a 'Dissemination Programme' under the ICAR-FAO collaborative project (FAO-TCP/RAS/3702) at College of Fishery Science, Muthukur, Andhra Pradesh on 29th Dec, 2021. A total of 60 participants including the Dean of Fishery Science Dr D. Ravindra Kumar Reddy, Sri Venkateswara Veterinary University (SVVU), Tirupati, Associate Dean, Faculty members and students of College of Fishery Science, Muthukur participated. Dr B. Madhusudana Rao, Principal Scientist, ICAR-CIFT and PI, FAO-TCP-AMR project delivered a technical talk on 'Aquaculture practices, antimicrobial use in freshwater fish culture of Andhra Pradesh & Steps to mitigate AMR in fisheries and Dr K. Ahamed Basha, Scientist, ICAR-CIFT and Co-Principal Investigator of FAO-TCP-AMR project delivered a talk on 'Antimicrobial Resistance in Freshwater Fish Aquaculture'.



Resource persons and participants at College of Fisheries, Muthukur

Important training programmes

1. PMMSY with ICAR-DoF convergence -Online training programmes on "Sustainable business opportunities in harvest and post-harvest fisheries"

Visakhapatnam Research Centre of ICAR-CIFT had conducted an online training programme under PMMSY with ICAR-DoF convergence on "Sustainable business opportunities in harvest and postharvest fisheries sector" on 24.02.2021 from 10.30 am to 1.00 pm. A total of 350 stakeholders including progressive entrepreneurs, fish farmers, fishermen, fisherwomen, NGO representatives, State Govt. officials, students, etc. attended the online training programme. About six lectures on harvest and postharvest fisheries sector of India, Sustainable business opportunities in harvest technology, Business opportunities in fish processing-value addition, Opportunities in utilizing rest raw materials from seafood industry, Seafood safety, Agribusiness Incubation Centre of ICAR-CIFT and Over view of PMMSY scheme and its implementation in Andhra Pradesh, were delivered during the programme



2. NEH Training programmes conducted at College of Fisheries, Lembucherra, Agartala

Visakhapatnam Research Centre of ICAR-CIFT conducted training programmes on "Fishing Technological interventions for inland fisheries" and "Skill development on value added fish products and entrepreneurship promotion" under NEH at College of Fisheries, Lembucherra, Agartala during 16-18 March 2021. Dr. P.K. Pandey, Dean, College of Fisheries, Lembucherra, Agartala formally inaugurated the training programme. Twenty-five beneficiaries representing fisherwomen, fishermen and progressive entrepreneurs from different parts of West Tripura, Khowai and Gomati districts enthusiastically participated in the training programme on "Skill development on value added fish products and entrepreneurship promotion". Inputs for fish harvesting like cast net webbing, foldable fish trap frame with webbing, gill net webbing and ready to operate gill net and cast nets, sinkers etc. were distributed to the participants. Inputs such as CIFT insulated fish bags, ice boxes, weighing machine, sealing machines, stainless steel utensils, mixer grinder, cutting boards, egg beaters, stainless steel trays, knives, scissors, ladels, plastic trays, and packaging material were handed over to fish processing division of the College of fisheries, Lembucherra.



Fisherwomen fabricating the foldable traps

Hands on training on fish filleting

3. Training programme on 'Good Aquaculture Practices to mitigate Antimicrobial Resistance:

ICAR-Central Institute of Fisheries Technology (ICAR-CIFT), Visakhapatnam Research Centre has organized a training programme on 'Good Aquaculture Practices to mitigate Antimicrobial Resistance (AMR) in freshwater fish aquaculture' at Fisheries Research Station of Sri Venkateswara Veterinary University (SVVU), Undi, West Godavari District, Andhra Pradesh on 01st Oct, 2021. The programme was organized under the FAO collaborative project entitled 'Support mitigation of Antimicrobial Resistance risk associated with aquaculture in Asia (FAO-TCP / RAS/ 3702). A total of forty people comprising of thirty five aquaculture farmers from Bhimavaram, Undi, Elivarru, Bondada, Mahadevapatnam, Pamulaparru, Cherukavada of West Godavari district, Andhra Pradesh and five technical personnel of Fisheries Research Station participated in the training programme. Dr. B. Madhusudana Rao, Principal Scientist, ICAR-CIFT and PI, FAO-TCP-AMR project Dr. K. Ahamed Basha, Scientist, and Co-PI, FAO-TCP-AMR project were the resources persons for the programme.



Good Aquaculture Practices training Undi, West Godavari District, Andhra Pradesh



Functions and Celebrations

National Science Day

The National Science Day, 2021 was celebrated on 23.02.2021 by ICAR-CIFT, Cochin, a 'Science Quiz' competition was organized for the staff members of ICAR-CIFT. The quiz was based on the theme 'Future of STI: Impact on Education Skills and Work'. A team of 10 numbers with two members each, participated in the competition.



Participants of online Science Quiz competition



Prize distribution to the winners by Dr. Ravishankar C.N., Director, ICAR-CIFT

World Water Day

ICAR-CIFT, Cochin celebrated the World Water Day 2021 on 22.03.2021 by organising a painting competition for the children of staff members of ICAR-CIFT. The painting competition was conducted for three categories under various themes viz., Water for Life (Sub-Junior level), Save Water, Save Nature (Junior level) and Save Water, Conserve Water, Save the World (Senior level). The topics were selected in accordance with the theme of World Water Day-2021 i.e., Valuing Water and the winners were awarded.



Prize distribution by Dr. A. K. Mohanty, HOD, EIS Division, ICAR-CIFT



Observance of Constitution Day (Samvidhan Divas) 2021

ICAR-CIFT observed the Constitution Day on 26th November 2021. All the Scientists and staff of the institute read the Preamble of Constitution along with the Hon'ble President of India by attending live programme telecasted from central hall of parliament, New Delhi. A special online talk on "Constitution of India in the present-day context" was organized in which the Guest speaker former Justice B.Kemal Pasha of High Court of Kerala, delivered a thought-provoking lecture about present day life of people in India in the context of Constitution of India. Scientific, technical and skilled support staff attended a webinar on 'The Relevance of Constitution in our life' organized by ICAR- Central Institute of Fisheries Technology (ICAR-CIFT), Cochin on 25th November 2021



A view of Preamble reading by Staff, at ICAR-CIFT

Swachhta Pakhwada

Institute along with the active participation of the centres, observed Swachhta Pakhwada from 16-31 December 2021. The programme was inaugurated with the Swachhta pledge administered by Director on the first day. Subsequently, a cleanliness drive was carried out in the institute by weeding out obsolete files/ material in the office. Laboratories and the premises were cleaned and the unwanted scrap materials were discarded. In connection with swachhta pakhwada, an online talk by Dr Sanjay Sengupta, Ex-Senior Principal Scientist, CSIR-NISCAIR, New Delhi on "Climate Change and its impact on Environment - way forward to preserve Globe Earth to the future population" was organized. Training programmes were organized in this connection at various places including Lakshadweep, on conversion of fish waste to feed, promising environmental upgradation and ensuring wealth from waste.



Cleanliness drive at ICAR-CIFT, Cochin



Cleanliness drive at Veraval Research Centre, ICAR-CIFT





Functions and Celebrations

In-house cleanliness drive at labs, office premises of the Institute



Dr. A. A. Zynudheen during the waste utilization demonstration at Lakshadweep

Kisan Diwas

'Kisan Diwas' was observed on 23rd December 2021 at Mumbai and Veraval Research centres of the Institute covering 60 fishermen and fisherwomen to sensitize fisherfolk about the technologies developed by ICAR.



Sensitizing workshop for the fisherfolk by Mumbai Research Centre during Kisan Diwas



Fishermen interacting with scientists on Kisan Diwas at Veraval research centre

Observance of National Campaign on the theme "Agriculture and Environment: The Citizen Face" under Azadi Ka Amrit Mahotsav

ICAR-CIFT, Cochin observed the National Campaign on the theme "Agriculture and Environment: The Citizen Face" Under Azadi Ka Amrit Mahotsav on 26th November 2021. A total of 154 students participated in the competition. E-Certificate was provided to students and winners were awarded with Certificate of Appreciation (first, second and third) in each category.



A view of the painting competition at CCPLM Anglo-Indian HSS, Thevara

International Yoga Day

ICAR-CIFT observed International Day of Yoga in online mode on 21.06.2021. All the Staff of the institute along with their family members performed the different asanas of Yoga following the digital resources available at the website of Ministry of AYUSH.





Hindi week

Hindi week celebrations were conducted during 14-21st September, 2020 at Visakhapatnam Research Centre of ICAR-CIFT. Competitions on "Identification and writing in Hindi" and 'Essay writing' were conducted during the Hindi week.

Independence Day



ICAR-CIFT celebrated Independence day at headquarters and research centres on 15 August, 2021 under COVID protocol. Dr. Ravishankar. C.N., The Director, ICAR-CIFT hoisted the National flag and addressed the gathering. At the Research centres, Scientist-in-charges hoisted the flag and did the honour.

Republic Day

The Republic Day honours were carried out at headquarters and research centres on 26 January, 2021.





WOMEN'S CELL

The International Women's Day was celebrated online at ICAR-CIFT. Cochin on 8th March 2021. Director of the Institute Dr C.N. Ravishankar addressed the staff and greeted everyone on the occasion Smt. Mercykutty Amma, Honorable Minister for Fisheries, Kerala sent a message to the women employees of the institute. The highlights of the programme included, Address by the Chief guest of the programme Dr. Beena IAS, Chairperson, Cochin Port Trust; Honouring senior most women staff by Director ICAR-CIFT; Award winning video on Smt Ramani Mani, Fish vendor, Nayarmbalam; Cultural programme - Song and Dance video sequence by ICAR-CIFT staff.

Apart from these programmes, on the occasion of International Women's Day senior most Women colleagues of the Institute, Dr Saly N Thomas, Principal Scientist and Smt Shyma TK, AAO were honoured by the Director. Smt Ramani Mani, a fisherwoman whose livelihood is vending fish was honoured for showing exemplary courage during COVID times by Director Dr C.N. Ravishankar. Press coverage was also arranged for the event.

രമണി മണിയുടെ മീൻവിൽപന അതിജീവനത്തിന്റെ മാത്വക

കൊപ്പി വിൽക്കാനുള്ള മത്സ്യ വുമായി സ്കൂട്ടറിൽ കറങ്ങുന്ന മധ്യവയസ്കയെ കണ്ട് പുറത്തു നിന്നുള്ളവർ അമ്പരന്നേക്കാം പക്ഷേ, വരാപ്പുഴ, ചേന്നൂർ നിവാ സികളുടെ പരിചിത കാഴ്ചയാ ണു രമണിച്ചേപ്പിയുടെ മീൻവിൽ പന. കേന്ദ്ര മത്സ്യ സാങ്കേതിക ഗവേഷണ സ്ഥാപനമായ 'സി ഫ്റ്റി'ലെ ഗവേഷകർ തയാറാ ക്കിയ സമ്മാനാർഹമായ ഡോ ക്യുമെന്ററിയിലെ നായിക കുടി അിയിട്ട് 25 വർ മെണി മണി യാണവർ. മത്സ്യമേഖലയുടെ കോവിഡ് അതിജീവനവുമായി ബന്ധപ്പെട്ടു രാജ്യാന്തര സംഘടന യായ 'വുമൺ ഇൻ സീഹുഡ്' നട ത്തിയ മത്സര രിൽ ചിത്രം ഒന്നാ

മതത്തി പാരി സിൽ നടക്കു ന്ന രാജ്യാന്തര ഹ്രസ്വചിത്ര രത്സരത്തിലേ ക്കും തിരഞ്ഞെ 520002151 വരാപ്പുഴ സ്വ

ദേശിയായ ഒര ണി മണി മീൻ വിൽപന തുട n8420363(TT)).

ആദ്യകാലങ്ങ

ളിൽ തലച്ചുമടായുള്ള വിൽപന യായിരുന്നു. ശാരീരിക പ്രശ്ന ങ്ങൾ തുടങ്ങിയതോടെയാണു പു സമ്മാനിച്ചു.

തിയ പരീക്ഷണത്തിനു മുതിർന്ന 65

സ്കൂട്ടർ ഓടിക്കാൻ പഠിച്ചു. പഴയൊരു സ്കൂട്ടർ സ്വന്തമാം കോവിഡ് കാലത്തു മീൻ കിട്ടാ തായപ്പോൾ പറവൂരിലും മഞ്ഞു മാൽ കവലയിലും പോയി മീൻ വാങ്ങിയും കച്ചവടം നടത്തി. കൊച്ചിയിൽ സ്കൂട്ടറിൽ മത്സ്യ വിൽപന നടത്തുന്ന ഏക സ്ത്രീ യാകും താനെന്ന് പറയുമ്പോൾ ചെറുചിരി. അതിജീവനത്തിൽ മാ തൃകയായ രമണി മണിയെ വനി താ ദിനത്തിൽ 'സിഫ്ട്' ആദരി ച്ചു. സിഫ്ട് ഡയറക്ടർ ഡോ. സി. എൽ. രവിശങ്കർ ഫലകം

Press clipping Malayala Manorama dated 09.03.2021



Director honouring Smt Ramani Mani, Vypin (fish vendor)



An exhibition of fish and fishery products by Women Self Help Groups under Society for Assistance for Fisherwomen (SAF) held at the Institute in connection with International Women's Day 2021.



Dr C.N. Ravishankar, Director of the Institute with the women SHGs at Exhibition

INSTITUTE JOINT STAFF COUNCIL (IJSC)

For the period under, three meetings of IJSC were held at ICAR-CIFT, Kochi itself. Due to covid pandemic, the activities of IJSC were limited. However, IJSC could sort out the major burning issues of staff members and amicably resolved them. Secretary staff side Shri P. S Nobi attended the Technical Anomaly Committee meeting of ICAR and the meeting of Central Government Employees Welfare Co-Ordination Committee through virtual mode.



ICAR-CIFT RECREATION CLUB

The recreation club of the institute plays a role to bring together the CIFT staff and maintains a lively relationship between the various sections. The club conducts different programmes among the staff and facilitates a stress-free working environment.

The New year 2021 was celebrated by welcoming the staff with a piece of cake and Recreation club designed wall calendar 2021. As a New Year gift, prestige vegetable cutter were distributed to all the staff members of the Institute.



Director CIFT inaugrating the new year Distribution

The club organized a charity box drive to collect money, to be given as financial aid to Smt. Reeta Lawrence for her cancer treatment. Smt. Reeta had worked as a contractual laborer in CIFT for more than 10 years





In light of the pandemic and the difficulty faced in obtaining a vaccination slot, Recreation club organized an in house vaccination drive for the benefit of all members and their family members in collaboration with the Sangeetha hospital, Mattancherry





Recreation Club arranged the distribution of awards for academic excellence to wards of staff. Cash awards were given to the wards of members for academic excellence. The awards were given for the following categories, based on the performance of wards in the final examinations held during 2019-20: (1) 10th or Equivalent (2) Plus two or Equivalent (3) Diploma (3 years) (4) Bachelor's degree.

The General Body Meeting of the Recreation Club held on August 04, 2021 and elected new office bearers of the ICAR-CIFT Recreation Club for the year 2021-23. As a farewell gift, committee distributed a pigeon induction base non-stick fry pan to all the staff members of CIFT.

Onam celebration was conducted on 14th August 2021, following all COVID-19 protocols. The function was started by lighting of traditional lamp by the Director Dr. C. N. Ravishankar. In front of the Corridor, a Pookalam (floral carpet) was arranged by our staff members and students. During the occasion, sarees were distributed to the cleaning staff as token of our happiness and gratitude. All the staff members were distributed sweet boxes containing Payasam, Banana Chips and Sarkkara Upperi. The celebration of 'Onam' in the Institute brought in a divine message of unity in diversity and a hope to overcome the pandemic.





COVID-19: COVISHIELD Vaccination programme was organised during the month of September 2021 for the staff of the Institute and their family members in collaboration with Lakshmi Hospital, Kochi from 9.30 am to 1.00 pm at Seminar Hall. Staff members including family members were given Covishield vaccine first and second doses as per their vaccination schedule.

A Voluntary Contribution from the staff members of the Institute was raised and handed over to M/s. Kochuthresia Charlie, Sweeper to rebuild her house in a safer zone, as the house was damaged completely due to the sea erosions.

A Book Fest was arranged through "The Hindu" Publication Group in order to popularise their new publications among staff members & promote reading habits among them. Books on various categories & publications suiting to all age groups were displayed and the opportunity was utilized by many of the staff members.



Upon the interest of the staff members to participate in the Inter Institution & District Carom Championship Organised by Carom Association & YMCA during October, necessary arrangements were made by the club and Shri Raja Saravanan and Shri Sajith K. Jose won the 01st Prize.





Representation in Committees



REPRESENTATION IN COMMITTEES

Dr. Ravishankar C. N.

As Chairman

- Scientific panel on Fish and Fish Products, Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Govt of India, New Delhi.
- Committee for drafting National Policy on Post Harvest Processing and Marketing of Fish and Fishery Products, NFDB, Department of Fisheries, Ministry of Agriculture and Farmers Welfare, Govt. of India.

As Member

- O Governing Body of ICAR Society, ICAR, Ministry of Agriculture & Farmers Welfare, New Delhi
- Scientific Committee, Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Govt of India, New Delhi
- Committee for drafting National Fisheries Policy, Department of Fisheries, Ministry of Fisheries, Animal Husbandry & Dairying, Govt. of India
- MPEDA Authority, Ministry of Commerce & Industry, Govt. of India, Cochin
- The Sub-Committee (Finance & Accounts) of the Governing Body of ICAR, Ministry of Agriculture & Farmers Welfare, New Delhi
- Sub-Committee on Administration of the Governing Body of ICAR, Ministry of Agriculture & Farmers Welfare, New Delhi
- O Academic Council, Central Institute of Fisheries Education, Mumbai
- O Executive Committee, Kerala Agricultural University, Thrissur
- O Board of Directors, Lakshadweep Development Corporation Limited, Cochin
- National Reference & Referral Laboratory on Fish and Fishery Products, Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Govt of India
- National Steering Committee, NetSCoFAN (Network for Scientific Co-operation for Food Safety and Applied Nutrition), Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Govt of India, New Delhi
- O Food & Agriculture Division Council, Bureau of Indian Standards, New Delhi
- Transport Engineering Division Council, Bureau of Indian Standards, New Delhi
- Textile Division Council, Bureau of Indian Standards, New Delhi
- Executive Committee, NETFISH (Network for Fish Quality Management & Sustainable Fishing), MPEDA, Ministry of Commerce & Industry, Govt. of India
- Expert Committee of the Ministry of Food Processing Industries (MoFPI) for considering the R&D proposal to be received under the scheme of Research and Development in the processed food sector
- Committee to Assess the Requirement of Common Incubation Facilities for Incubation Centres to be Set up Under PMFME Scheme, MoFPI, Govt. of India



- Technical Advisory Committee for Promotion and Development of Seaweed Farming and Value Chain, Department of Fisheries, Ministry of Fisheries, Animal Husbandry & Dairying, Govt. of India
- NABL Accreditation Committee, ICAR, New Delhi
- O Agri-Business Incubation programme Implementation committee, ICAR, New Delhi
- O Sectional Committee of Fisheries, National Academy of Agricultural Sciences, New Delhi
- Industrial Advisory Board, Department of Food Science and Technology, Kerala University of Fisheries and Ocean Studies, Cochin
- Expert Committee, Sacred Heart College, MG University, Cochin
- Technical Assessor, National Accreditation Board for Testing and Calibration of Laboratories, New Delhi

Dr. Leela Edwin

As Member

- O Technical Committee to review ban period, Dept. of Fisheries, Govt of Kerala
- Faculty of Marine sciences nominated by Vice-Chancellor, CUSAT, Kochi
- Technical Committee constituted by MPEDA to modify CIFT-TED as per NOAA recommendations
- Expert Committee constituted by Govt. of Maharashtra to curb unsustainable marine fish capture practices and ensure sustainable fisheries in Maharashtra
- Joint Working Group under India-Saudi Strategic Partnership and presented "India's strengths in modern fishing techniques"
- O Board of Studies, Faculty of Marine Sciences, CUSAT
- M.F.Sc. Advisory committee of KUFOS
- NOAA-MMPA-CFA committee constituted by MPEDA
- Inland Harbour Crafts and Fishing Vessels Sectional Committee (TED 18 of BIS)
- O Ockhi special package committee on craft and gear
- O State Fisheries management Council (SFMC) organised by Govt. of Kerala

Dr. Suseela Mathew

As Chairman

o Institute Animal Ethics Committee, ICAR - CIFT, Cochin

As Member

- RAC, IMC, QRT, ITMU.
- O IMC Member, CMFRI, Cochin, NBFGR, Lucknow
- Academic council member of KUFOS, Member, Internal Quality Assurance Cell (IQAC), KUFOS
- o Advisory seaweed Committee member TIFAC



- Scientific Expert, MPEDA Selection Board.
- O NABL Lead Assessor
- O Subject Expert for review of projects DBT, KSCSTE
- External Examiner CUSAT, Kochi, KUFOS, Kochi, College of Fisheries, Thoothukkudi, Mar Athanasius College, Kothamangalam

Dr. A.A.Zynudheen

As Member

- Assessment Panel of Experts (APE) constituted by Export Inspection Council, Government of India
- O Technical Working Group, Ministry of Fisheries, Government of India

Dr. George Ninan

As Member

- Expert Working Group on Fish Processing Sector in Kerala constituted by State Planning Board, Kerala for the formulation of 14th Five Year Plan
- Subsidy committee of MPEDA (TIUSMP scheme) on 15.11.2021

Dr. Toms C. Joseph

As Member

- Board of Studies of Faculty of Veterinary & Animal Sciences, Kerala Veterinary and Animal Sciences University.
- Board of studies, Faculty of Ocean Science and Technology and Faculty of Fisheries Management
- O Institutional Bio-safety committee (IBSC) of Cochin University of Science and Technology

Dr.T.V. Sankar

As Member

- O Scientific Panel on Fish and Fishery Products, FSSAI, Govt. of India, New Delhi
- FAO12, Fish, Fisheries and Aquaculture Sectional Committee, Bureau of Indian Standards (BIS), New Delhi
- O Indian delegation, ISO/TC234, FAO12, Bureau of Indian Standards (BIS), New Delhi

Dr. Saly N. Thomas

As Chairman

 Textile Materials for Marine/Fishing Purposes Sectional Committee TXD 18, Bureau of Indian Standards



As Member

- 4th phase of GESAMP Working Group 40: Sources, fate and effects of marine plastics and microplastics (4th Phase: Assessing the social, economic and ecological risks of marine litter and microplastics).
- Technical Committee constituted by Matsyafed, Kerala to evaluate the technical bids received for supply of goods to Matsyfed Net Factory
- National Task Force (NTF) for implementation of Glo Litter Project
- O Guest Editor Marine Policy (Journal) Special issue on ALDFG

Dr. M.P. Remesan

As Member

- Technical Committee constituted by MPEDA to modify CIFT-TED as per NOAA recommendations
- M.F.Sc. Advisory committee of KUFOS

Dr Manoj P Samuel

As Chairman

• Session on 'Storing, Packaging and Branding' in the VAIGA (Value Addition for Income Generation in Agriculture) Seminar at Thrissur on 12 February 2021

As Member

• Evaluation committee - BIRAC- BIG and GYTI schemes

Dr. R. Raghu Prakash

As Member

- Technical Committee Constituted by Dept. of Fisheries, Andhra Pradesh to conduct Inspection on the operation of Ring nets and its impact
- Selection committee of SMS (Agrometeorology) on consolidated basis under DAMU project

Dr. U. Sreedhar

As Member

- Technical Committee Constituted by Dept. of Fisheries, Andhra Pradesh to conduct Inspection on the operation of Ring nets and its impact
- Assessment Committee for Promotion of Technical Personnel under Category I & II of CMFRI for various divisions: MBTD, Library, MBD, MFD, SEETTD, Mariculture, CFD, DFD, FEMD, FRAD & PFD Divisions.

Dr. Ashaletha S.

As Editor

• Journal of the Marine Biological Association

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Dr. Femeena Hassan

As Member

• Assessment Panel of Experts (APE) constituted by Export Inspection Council, Government of India

Dr B. Madhusudana Rao

As Member

- Panel for Technologist Assessment, by Export Inspection Agency, Visakhapatnam
- Assessment Panel of Experts (APE), for the inspection of seafood processing plants in Andhra Pradesh
- O 7th Academic Council of Dr V.S. Krishna Govt. Degree College (A), Visakhapatnam
- Interview committee for conducting walk-in interview for selection of candidates for SMS (Agrometeorology) and AgrometerObserver for Krishi Vigyan Kenda (KVK), Amadalavalasa
- 17th meeting of the Food Hygiene, Safety Management and Other Systems Sectional Committee, FAD 15, Bureau of Indian Standards (BIS) New Delhi
- Annual Board of Studies (BoS) of the Department of Food, Nutrition and Dietetics, Andhra University
- DIEPC sub-committee for Sea Food and Marine Products at the office of the Joint Director of Fisheries, AP state Government, Visakhapatnam
- o 66th Executive Committee Meeting of Rajiv Gandhi Centre for Aquaculture (RGCA)
- Indian delegation CODEX ad-hoc Intergovernmental Task Force on Antimicrobial Resistance (TFAMR8) 4.10.2021 to 9.10.2021, 13.10.2021 and 16.10.2021

Dr. G. K. Sivaraman

As Chairman

• Modified Assured Career Progression Scheme (MACPS) & Departmental Promotion Committee Coir Board, Cochin, Kerala

As Member

- O IBSC, Vety College, Mannuthy
- IBSC, ICAR- CMFRI, Cochin
- Research Guide for Master's & PhD, KUFOS, Cochin.
- O Assessment Panel Member of Export Committee
- NABL Authorized signatory
- Selection Board Member, Fisheries Faculty of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharastra
- Technical Evaluation Committee KUFOS, Panagad, Cochin
- Departmental Promotion Committee, Marine Product Export Developmental Agency (MPEDA), Cochin, Kerala.



- O Rajiv Gandhi Centre for Aquaculture (RGCA), MPEDA, Cochin
- Editorial Board, Agriculture Letter
- O Doctoral Committee, Department of Biotechnology, SRMIST, Kattankulathur, TN.
- Visiting Faculty of IIT-Delhi, Co-supervisor for PhD & visiting faculty of IIT-Delhi
- Editorial Board, International Journal of Zoology and Animal Biology
- SOFTI, Society of Fisheries Technologists, India.
- Editorial Board, International Journal of Clinical Biology and Biochemistry
- O Editorial Board Member of UPI J. of Chemical and Life Sciences

Dr. V.R. Madhu

As Member

- Technical Committee constituted by MPEDA to modify CIFT-TED as per NOAA recommendations
- Working Committee on Flower shrimp FIP
- Expert Sub Group (ESG) on "Infrastructural Challenges In Kerala's Marine Fisheries Sector" by The Kerala State Planning board for formulating 14th five year plan

Dr. Satyen Kumar Panda

As Member Secretary

• FSSAI Working Group on Development of Standards for Fermented Fishery Products

As Convener

- FAD 15/ Panel 1: To review and revise IS 5404 : 1984 'Methods for drawing and handling of food samples for microbiological analysis
- FAD 15/ Panel 3 Review of Indian Standards related to Microbiological Media Ingredients

As Member

- O FSSAI Scientific Panel on Fish and Fisheries Products
- o Method Review Group, FSSAI
- o RAFT Committee, FSSAI on approval of rapid food testing kits
- O Fish, Fisheries and Aquaculture Sectional Committee, FAD 12, Bureau of Indian Standards
- Food Hygiene, Safety Management and other systems sectional committee, FAD 15, Bureau of Indian Standards
- o Technical Working Group, Ministry of Fisheries, Government of India
- FSSAI Technical Evaluation Committee for setting up of Microbiology Laboratory under Central Sector Scheme
- Assessment Panel of Experts (APE) constituted by Export Inspection Council, Government of India



- ISO SC9 WG30 for mass spectrometry based method development for Staphylococcal enterotoxin.
- ISO SC9 WG-3 for Validation of Bacterial Toxin Methods
- FAD 27 & FAD 28 of Bureau of Indian Standards
- Working group on formaldehyde in fish and shellfish by FSSAI

Dr. L. N. Murthy

As Member

• Evaluation committee of food sensory evaluation of 'Vegan egg products" developed by AV foods, Mumbai

Dr. M. V. Baiju

As Member

- Expert Committee constituted by the Hon' Administrator, Union Territory of Lakshadweep for the design development of Pole and liner cum Long liner
- State level Technical Committee of Department of Fisheries, Odisha for the implementation of PMMSY scheme in the state.
- Expert committee constituted by the Director of Fisheries, Govt. of Kerala for the manning and AMC of 3 marine ambulance constructed by Cochin Shipyard for the Department of Fisheries
- Inland Harbour Crafts and Fishing Vessels Sectional Committee (TED 18 of BIS)
- Committee to finalize the documents of submersible platform for research at Naval Physical and Oceanographic Laboratory (NPOL, DRDO)
- Expert Sub Group (ESG) on "Infrastructural Challenges In Kerala's Marine Fisheries Sector" by The Kerala State Planning board for formulating 14th five year plan

Dr. Sajeev M.V

As External Expert

O Selection Committee for State Coordinator in NETFISH-MPEDA for the Tamil Nadu North region

Dr. C.O. Mohan

As Member

• Advisory committee Member for PhD and Post Graduate students in various universities

Dr. Binsi P. K.

As Member

O External advisor M.F.Sc. (Fish Processing Technology) in KUFOS, Kerala



Dr. Ashish Kumar Jha

As Member

- O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India
- Physical Verification Committee of MPEDA

Dr. Murugadas V.

As Member

• Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Dr. Viji P.

As Member

O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Dr. Sandhya K.M.

As Member

• Textile Materials for Marine/Fishing Purposes Sectional Committee TXD 18, Bureau of Indian Standards.

Dr. Prajith K.K.

As Member

- NOAA-MMPA-CFA committee constituted by MPEDA
- Marine mammal fishery interaction committee by MPEDA

Dr. Remya S.

As Member

O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Dr. Laly S.J.

As Member

- O Working group on formaldehyde in fish and shellfish by FSSAI
- O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Dr. Jesmi Debbarma

As Member

O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Dr. Parvathy U.

As Member

- Governing council for Agri Business Incubation
- PhD Research committee of Kerala University of Fisheries and Ocean Studies
- PhD Research committee of Cochin University of Science and Technology



- Kerala State Planning Board 14th Five Year Plan (2022-2027): Expert Working Group on Fish Processing Sector in Kerala
- O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Shri. G. Kamei

As Member

• Technical Committee Constituted by Dept. of Fisheries, Andhra Pradesh to conduct Inspection on the operation of ring seine nets and its impact

Dr. Anupama T.K

As Member

- O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India
- Physical Verification Committee of MPEDA

Dr. Pankaj Kishore

As Member

O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Shri. S. Sreejith

As Member

- O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India
- Physical Verification Committee of MPEDA

Dr. Ahamed Basha

As Member

O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Dr. Anuj Kumar

As Member

- O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India
- O Board of Studies (Food Technology), VFSTR, Guntur

Dr. Elavarasan K.

As Member

- O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India
- Comprehensive Viva Voce Examination of (Fish Processing Technology) students of 2019 batch of Dept.of Fish Processing Technology, KUFOS

Dr. Devananda Uchoi

As Member

O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India



Dr. Sarika

As Member

- O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India
- Physical Verification Committee of MPEDA

Mrs. Greeshma S.

As Member

- Evaluation committee of food sensory evaluation of 'Vegan egg products" developed by AV foods, Mumbai
- Virtual assessment of 51 seafood technologist organized by EIA, Mumbai
- O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Shri Paras Nath Jha

As Member

• Technical Committee constituted by MPEDA to modify CIFT-TED as per NOAA recommendations

Ms. Priya E. R.

As Member

O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Dr. Abhay Kumar

As Member

O Assessment Panel of Experts (APE) constituted by Export Inspection Council, Govt. of India

Dr. S. Murali

As Member

O MPEDA Physical verification committee for their TUSMP Subsidy scheme

Smt. Alfiya P. V.

As Member

- Committee for evaluation of science projects in the 48th Jawaharlal Nehru National Science Mathematics and Environment Exhibition (JNNSMEE) 2021
- Staff selection committee constituted for guest faculty in the Department of Food Technology at KUFOS, Panangad

Dr. J. Renuka

As Chairperson

 Assessment Committee of Technical Staff of ICAR-Indian Institute of Spices Research (IISR), Kozhikode

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Important Institute Committees

Quinqennial Review Team (QRT)

Chairman: Dr. K. S. M. S. Raghava Rao, Director, CSIR-CFTRI.

Members:

- 1. Dr. B. Sundaramoorthy, Dean (I/c), Prof. & Head, Dr. MGR Fisheries College & Research Centre, TNJFU, Nagapattinam
- 2. Dr. K. C. Dora, Former Dean, Dpt. of Fish Processing Technology, KBAFS, Kolkatha (WB)
- 3. Dr. Udey S. Annapure, Prof. & Head, Institute of Chemical Technology, Mumbai
- 4. Dr. V. R. Joshi, Former Prof. & Head, College of Fisheries, Ratnagiri
- 5. Dr. N. Bhaskar, Advisor, FSSAI

Member Secretary: Dr. Satyen Kumar Panda, Principal Scientist, QAM Division, ICAR-CIFT, Kochi

Research Advisory Committee (RAC)

Chairman: Dr. S. D. Tripathi, Former Director, ICAR-CIFE, Mumbai

Members:

- 1. Dr. A. K. Upadhyay, Prof. & HOD, College of Fisheries, Pantnagar
- 2. Dr. K. Rathnakumar, Dean, College of Fisheries Engineering, TNJFU, Nagapattinam
- 3. Dr. K. N. Gurudutt, Former Head, CFTRI, Mysore
- 4. Dr. M. N. Venugopal, Former Prof., College of Fisheries, Mangalore
- 5. Prof. Biswanth Sadangi, Former Head, ICAR-CIWA & Emeritus Scientist, ICAR-NRRI
- 6. Asst. Director General (M.Fy), ICAR, New Delhi
- 7. Director, ICAR-CIFT, Kochi

Member Secretary: Dr. V. R. Madhu, Principal Scientist, ICAR-CIFT, Kochi

Institute Management Committee (IMC)

Chairman: Dr. Ravishankar C. N., Director, ICAR-CIFT

Members:

- 1. Shri P. Sahadevan, Additional Director of Fisheries, Directorate of Fisheries, Kerala
- 2. Shri. H.S Veerappa Gowda, Director, Directorate of Fisheries, Bangalore 56001
- 3. Dr. G. Sugumar, Director (i/c), DIVF, TNJFU, Tamilnadu
- 4. Shri K. S. Shaiju, R/o Kalathil House, Edavanakkad, Ernakulam
- 5. Smt. Samyuktharani K., R/o Kayakkalath Sivasthuthi Bhavan, Puthiyappa, Kozhikode



- 6. Dr. Rani Palaniswami, Officer-in-charge, Research Centre of CIFRI, Kochi
- 7. Dr. Alavandi S. V., HOD, ICAR-CIBA, Chennai
- 8. Dr. S. Kalavathi, Principal Scientist, ICAR-CPCRI, Kayamkulam
- 9. Dr. K. V. Rajendran, HOD, ICAR-CIFE, Mumbai
- 10. Assistant Director General (M. Fy.), ICAR, New Delhi 12
- 11. Finance and Administrative Officer (FAO), ICAR-CTCRI, Trivandrum

Member Secretary: Senior Administrative Officer, ICAR-CIFT, Kochi

Grievance Cell

Chairman: Dr. Ravishankar C. N., ICAR-CIFT, Kochi

Members:

- 1. Dr. George Ninan, Principal Scientist & HOD(i/c), Engg. Dvn., ICAR-CIFT.
- 2. Shri Mahesh B. Khubdikar, Chief Admn. Officer, ICAR-CIFT
- 3. Shri Prashant Kumar, Chief Fin. & Accts. Officer, ICAR-CIFT
- 4. Dr. Ranjith Kumar Nadella, Scientist, ICAR-CIFT
- 5. Shri Babu K.S, Tech. Officer., ICAR-CIFT
- 6. Smt. Sobha K S, UDC, ICAR-CIFT
- 7. Smt. Mary Vineetha P.T, SSS, ICAR-CIFT.

Member Secretary: Shri R. N. Subramanian, Admn. Officer, ICAR-CIFT, Cochin

Institute Joint Staff Council (IJSC)

Chairman: Dr. Ravishankar C. N., Director, ICAR-CIFT

Members (Official Side):

- 1. Dr. K. Asok Kumar, PS & HOD, FP Dvn., ICAR-CIFT
- 2. Dr. Leela Edwin, PS & HOD, FT. Dvn., ICAR-CIFT
- 3. Dr. Amulya Kumar Mohanty, PS & HOD EIS Dvn., ICAR-CIFT
- 4. Shri Prashant Kumar, CF&AO, ICAR-CIFT
- 5. Shri R.N. Subramanian, AO, ICAR-CIFT

Secretary (Official Side): Shri W. Sreenivasa Bhat, Sr. Admn. Officer, ICAR-CIFT

Members (Staff Side):

- 1. Shri. K. B. Sabukuttan, Asst. Admn. Officer, ICAR-CIFT
- 2. Shri. K. Das., Assistant, ICAR-CIFT
- 3. Shri. Vipin Kumar V., Sr. Tech. Assistant, ICAR-CIFT
- 4. Shri. A. Vinod, SSS, ICAR-CIFT
- 5. Shri. P. Raghavan, SSS, ICAR-CIFT

Secretary (Staff Side): Shri P. S. Nobi, Tech. Officer, ICAR-CIFT.

Important Institute Committees



Project Monitoring & Evaluation Committee (PMC)

Chairman: Dr. C. N. Ravishankar, Director, CIFT, Cochin.

Members:

- 1. Dr. K. Asok Kumar, PS & HOD (i/c), FP Dvn., ICAR-CIFT
- 2. Dr. Toms C Joseph, PS & HOD (i/c), MFB Dvn., ICAR-CIFT
- 3. Dr. Leela Edwin, PS & HOD, FT. Dvn., ICAR-CIFT
- 4. Dr. Amulya Kumar Mohanty, PS & HOD (i/c) EIS Dvn., ICAR-CIFT
- 5. Dr. George Ninan, PS & HOD (i/c), Engg. Dvn., ICAR-CIFT
- 6. Dr. Suseela Mathew, PS & HOD (i/c) B&N Dvn., ICAR-CIFT
- 7. Dr. A.A. Zynudheen, PS & HOD (i/c) QAM Dvn., ICAR-CIFT

Member Secretary: Dr. T.V. Sankar, PS & In-Charge, PME cell





List of on-going Research Projects

Institute Projects

SI. No	Name of Project	Principal Investigator	Location of Project	Co-Investigators/ Project Associates
1	Studies on fishing operations and energy use for formulation of guidelines for selected small scale fisheries of India	Dr. Leela Edwin	Cochin Veraval	Dr. Leela Edwin Dr. Saly N. Thomas Dr. M. V. Baiju Dr. Prajith K. K. Dr. Sandhya K. M. Dr. Manjulekshmi N Dr. Renjith R. K. Shri Paras Nath Jha
2.	Studies on resource and energy conservation of trawl systems	Dr. M. P. Remesan	Cochin Veraval Visakhapatnam	Dr. Raghu Prakash R Dr. MV Baiju Dr. Madhu V. R. Dr. Prajith K. K. Dr. Renjith R. K. Dr. Chinnadurai S. Shri Paras Nath Jha
3.	Enhancement of life of fishing materials using nanotechnology	Dr. Muhamed Ashraf P.	Cochin	Dr. Leela Edwin Dr. Saly N. Thomas Dr. Chinnadurai S. Dr. Manjulekshmi N. Dr. Sandhya K. M.
4.	Studies on fish behavior as an input for developing responsible fishing systems	Dr. Madhu, V. R.	Cochin	Dr. Prajith K. K. Dr. Renjith R. K. Dr. Chinnadurai S. Dr. Tejpal C. S. Shri Paras Nath Jha
5.	Technological interventions for improvement of fishing systems in selected inland water bodies of India	Dr. Sandhya K. M.	Cochin Visakhapatnam	Dr. Saly N. Thomas Dr. U. Sreedhar Dr. M. P. Remesan Dr. M. V. Baiju Dr. Prajith K. K. Shri G. Kamei Dr. Renjith, R. K.
List of on-going Research Projects



6	Interventions in processing and preservation of commercial and unconventional fishery resources	Dr. George Ninan	Cochin Veraval Mumbai Visakhapatnam	Dr. Zynudheen A. A. Dr. Bindu J. Dr. Mohan C. O. Dr. Joshy C. G. Dr. Binsi P. K. Smt. Sreelakshmi K. R. Dr. K. Sarika Dr. Parvathy U. Smt. Rehana Raj Dr. Laly S. J. Smt. Greeshma S. S. Dr. Jeyakumari A. Dr. Abhay Kumar Dr. Viji P. Dr. Toms C. Joseph
7	Valorisation of marine and agro waste for development of green packaging materials	Dr. Bindu J.	Cochin Veraval Mumbai Visakhapatnam	Dr. Remya S. Shri Satish Kumar Smt. Sreelakshmi K. R. Dr. Toms C. Joseph Dr. Renuka V. Smt. Priya E. R. Dr. Sarika K. Shri. Sreejith S. Dr. Jesmi Debbarma Dr. Rehana Raj
8	SMART PACK: Development and characterization of smart packaging films for enhancing quality and shelf life of fishery products	Dr. C. O. Mohan	Cochin	Dr. Ravishankar C. N. Dr. K. Ashok Kumar Dr. Satyen Kumar Panda Dr. Joshy C. G. Dr. Visnuvinayagam S. Dr. Elavarasan K. Dr. S. Remya Mrs. Sreelekshmi K. R. Dr. Pankaj Kishore Dr. Anuj Kumar Shri Ranjit Kumar Nadella



9	Development and validation of biomedical and cosmetic products from secondary fishery raw materials	Dr. Binsi P. K.	Cochin Veraval Mumbai Visakhapatnam	Dr. Zynudheen A. A. Dr. Muhammed Ashraf P. Dr. Anandan R. Dr. Femeena Hassan Dr. Viji P. Dr. Renuka K. Dr. Jeyakumari A. Dr. Parvathy U. Dr. Anupama T. K. Shri Ezhil Nilavan Dr. Sarika K. Dr. Rehana Raj Dr. Laly S. J.
10	Development of Soft Computing Systems in Fisheries Technology for Technology Dissemination and Policy Formulation.	Dr. Joshy C. G.	Cochin	Dr. Ashok Kumar K. Dr. George Ninan Dr. Zynudheen A. A. Dr. Satyen Kumar Panda Dr. Elavarasan K. Dr. Suresh A. Shri Premdev
11	Process development and scaling up of production of different molecular weight chitosan with different degree of de-acetylation and evaluation of their applications	Dr. Elavarasan K.	Cochin	Dr. Ashok Kumar Dr. J. Bindu Dr. C. O. Mohan Dr. C.G. Joshy Dr. Jeyakumari A. Dr. V. Renuka Dr. Tejpal C. S.
12	Ensuring safety of fish and fishery products: Framework for validating Regulatory specifications	Dr. Satyen Kumar Panda	Cochin Veraval Mumbai	Dr. Zynudheen A. A. Dr. Femeena Hassan Dr. Devananda Uchoi Dr. Laly S. J. Dr. C. O. Mohan Dr. Pankaj Kishore Dr. Anupama T. K. Mrs. Priya E. R. Dr. Niladri Sekhar Chatterjee Dr. Bindu J. Dr. Anuj Kumar Dr. Remya S. Dr. A. Suresh Dr. Joshy C. G. Dr. V. Murugadas Dr. Teipal C. S.

List of on-going Research Projects



13	Enhancing Utilization of rest Raw Materials of Aquatic Origin for feed, Agricultural and Industrial product development	Dr. Zynudheen A. A.	Cochin Veraval Mumbai Visakhapatnam	Dr. Femeena Hassan Dr. Binsi. P. K Dr. Elavarasan K. Dr. Jeyakumari A. Dr. Parvathy U. Dr. Parvathy U. Dr. Renuka V. Dr. Devananda Uchoi Dr. Joshy C. G. Dr. K. Sathish Kumar Dr. Visnu Vinayagam Dr. Remya S. Dr. Pankaj Kishore Dr. Madhu V. R Dr. Sangeetha (Assistant professor, KVK Kottayam) Dr. Sekhar M. (Scientist, CMFRI, Vizag Centre) Dr. V. Sreenivasan (IISR, Calicut)
14	Biotechnological approaches for utilisation of aquatic microbial resources and their products	Dr. Toms C. Joseph	Cochin Veraval Mumbai Visakhapatnam	Dr. M. M Prasad Dr. B. Madhusudana Rao Dr. G. K. Sivaraman Dr. Murugadas V. Dr. Visnuvinayagam S. Shri Radhakrishnan Nair V. Shri Ranjit Kumar Nadella Shri Ezhil Nilavan Smt. Greeshma S. S. Smt. T. Muthulakshmi Dr. Minimol V. A. Dr. K. Ahamed Basha Dr. Remya S. Dr. Elavarasan K. Dr. Divu. D. Dr. Suresh Kumar Mojjada
15	Virulence and antibiotic resistance profiling of seafood borne pathogens and development of control measures	Dr. Visnuvinayagam Sivam	Cochin Veraval Mumbai Visakhapatnam	Dr. Prasad M.M (till 31-05- 2021) Dr. Toms C. Joseph Dr. G. K. Sivaraman Shri V. Radhakrishnan Nair Dr. V. Murugadas Shri Ranjith Kumar Nadella Mrs. Greeshma S. S. Mrs. T. Muthulakshmi Dr. V. Minimol Shri S. Ezhil Nilavan



16	Seaweeds of Indian Coast as Source of Bioactive compounds for Developing Nutraceuticals/ Functional Foods	Dr. Suseela Mathew	Cochin	Dr. R. Anandan Dr. Asha K. K. Dr. Niladri S. C. Dr. Tejpal C. S. Dr. Lekshmi R. G. K. Shri Anas K. K. Dr. Renuka Vijaykumar Dr. T. K. Anupama Dr. Ashish Kumar Jha Dr. Elavarasan K.
17	Novel Bio- Molecules for Food and Nutraceutical Applications from Marine Resources	Dr. K. K. Asha	Cochin	Dr. Suseela Mathew Dr. R. Anandan Dr. Tejpal C. S. Dr. Lekshmi R. G. K. Shri Anas K. K. Dr. Renuka Vijaykumar
18	Evaluation of anti- nutritional factors (ANFs) / secondary metabolites in fish feed and feed ingredients	Dr. Tejpal C. S.	Cochin	Dr. Elavarasan K. Dr. Lekshmi R. G. K. Shri Anas K. K. Dr. Sanal Ebeneezer
19	Engineering interventions in post-harvest sector	Dr. George Ninan	Cochin	Dr. Murali S. Smt. Alfiya P. V. Dr. Aniesrani Delfiya D. S. Dr. Lekshmi R. G. K.
20	Evolving SMART EDP module for livelihood security of small scale fisherfolk through fish-preneurship	Dr. A. K. Mohanty	Cochin	Dr. S. Ashaletha Dr. Sajeev M.V. Dr. Pe. Jeyya Jeyanthi Dr. Sajesh V. K. Dr. Rejula K.
21	Occupational structure, labour productivity and labour migration in the fisheries sector	Dr. Nikita Gopal	Cochin	Dr. V. Geethalakshmi Dr. A. Suresh Dr. M. V. Sajeev Dr. Pe. Jeyya Jeyanthi Shri V. Chandraskekar



22	A study on the entrepreneurship ecosystem in fisheries and the cybernetics of Women Initiated Enterprises in Fisheries (WIEF) in selected coastal states of India	Dr. Ashaletha S.	Cochin Veraval Mumbai Visakhapatnam	Dr. A. K. Mohanty Dr. Suresh A. Dr. Sajesh V. K. Dr. Rejula K. Dr. Monalisha Devi (Mumbai) Dr. Anupama T. K. (Veraval) Dr. Viji P. (Vizag)
23	Assessing the input and service delivery system for marine fisheries in Kerala	Dr. A. Suresh	Cochin	Dr. A. K. Mohanty Dr. Nikita Gopal Dr. V. Geethalakshmi Dr. S. Ashaletha Dr. Sajeev. M.V Dr. V. Chandraskekar Dr. Sajesh V.K. Dr. Rejula K
24	An Assessment of Extension System in Marine Fisheries Sector of Kerala	Dr. Sajesh. V. K.	Cochin	Dr. Amulya Kumar Mohanty Dr. Ashaletha S. Dr. A. Suresh Dr. Pe. JeyyaJeyanthi Dr. Rejula K. Dr. Renjith R. K. Smt. Sreelakshmi K. R.
25	Fishing Technological interventions for sustainable Marine Ecosystem services along the East coast of India	Dr. R. Raghu Prakash	Visakhapatnam	Dr. U. Sreedhar Dr. Jesmi Debberma Dr. M.V. Baiju Shri G. Kamei Dr. Jeyanthi P. Dr. Rajendra Nayak Dr. Madhu V.R.
	Augmenting value			Dr. P. Viji
	and safety of wild			Dr. Jesmi Debbarma
26	East Coast through technological approaches	Dr. B. Madhusudana Rao	Visakhapatnam	Dr. K. Ahamed Basha, Dr. U. Parvathy



27	Development of seaweed based edible and functional sachet for food packaging applications	Dr. Jesmi Debbarma	Visakhapatnam	Dr. B. Madhusudana Rao Dr. P. Viji Shri Sreejith S.
28	Safety and quality aspects of fish and fishery product from Gujarat coast	Dr. Ashish Kumar Jha	Veraval	Dr. Anupama T. K. Shri Sreejith S. Dr. Sarika K.
29	Assessment of fish harvest and post-harvest technological aspects and mitigation measures for problems with special reference to Maharashtra	Dr. L. Narasimha Murthy	Mumbai	Dr. Nikita Gopal Dr. A. Jeyakumari Dr. Laly S. J. Dr. Abhay Kumar Dr. S. Monalisha Devi Smt. Greeshma S. S. Dr. Rehana Raj





Externally Funded Projects

		International P	rojects	
SI. No.	Name of Project	Principal Investigator	Location of Project	Co-Investigators/ Project Associates*
1	Diagnostics for one health and user driven solutions for AMR (DOSA)	Dr. G. K. Sivaraman	Cochin	-
2	North East India One Health Study on Transmission Dynamics of Antimicrobial Resistance (NEOSTAR)	Dr. G. K. Sivaraman	Cochin	-
3	Establishing value chain for fish: Towards nutritional security for rural population	Dr. C.N. Ravishankar	Cochin	Dr. Suseela Mathew Dr. A. K. Mohanty Dr. George Ninan Dr. Sajeev. M. V. Dr. C. G Joshy Dr. C. O. Mohan Dr. Elavarasan K. Dr. Satyen Kumar Panda Dr. Manoj P. Samuel Dr. Murali S. Dr. D. S. A. Delfiya Dr. R. Anandan Dr. Asha K.K. Dr. Niladri S. Chatterjee Dr. Tejpal C. S Dr. Murthy L. N. Dr. Murugadas V.
4	Future Refrigeration India: INDEE+ (Indo Norwegian project)	Dr. Ravishankar C. N.	Cochin	Dr. George Ninan Dr. Manoj P. Samuel Dr. Murali S. Dr. Baiju M. V. Dr. Jeyakumari A. Dr. Arun B. S.*
5	Support mitigation of Antimicrobial Resistance (AMR) risk associated with aquaculture in Asia	Dr. B. Madhusudana Rao, Principal Scientist	Visakhapatnam	Dr. K. Ahamed Basha Shri M. Shanmukha Rao* Shri M. Dhamodher*



National Projects

Indian council of Agricultural Research

6	Global Warming Potential (GWP) of Mechanized fishing methods of India and mitigation strategies: analysis using life cycle assessment (LCA) – data envelopment analysis (DEA) approach	Dr. Leela Edwin	Cochin Veraval Visakhapatnam	Dr. Raghu Prakash R. Dr. Madhu V. R. Dr. M.V. Baiju Dr. Prajith K. K. Dr. V. Chandrasekar Dr. Manju Lekshmi N. Shri Paras Nath Jha Shri Sreejith S. Kumar* Shri Rithin Joseph* Smt. Yasmi V. S.*
7	Zonal Technology Management (ZTM)- Agri Business Incubation (ABI) Centre	Dr. George Ninan	Cochin	Dr. C. O. Mohan Dr. N. S. Chatterjee Dr. A. Suresh Dr. Remya S. Smt. Alfiya P. V. Smt. Razia Mohamed A.* Dr. Ajeesh Kumar K. K.* Shri Lijin Nambiar M. M.* Shri Mohd. Safwan T. A.* Dr. B. Madhusudana Rao Dr. L. N. Murthy
8	All India Network Project on Fish Health	Dr. Ashok Kumar K.	Cochin	Dr. Satyen Kumar Panda Dr. Rajisha R.* Mrs. Nanitha Krishna E. K.*
9	Biomodulation of Marine Biopolymers for the Preparation of Biomaterials of healthcare importance	Dr. R. Anandan	Cochin	Dr. Pavan Kumar Dara* Dr. Mahadevan R.*
	Network programme			
	on Assessment of			Dr.V. Murugadas
10	Antimicrobial Resistance	Dr. M. M. Prasad / Dr.	Cochin	Dr. G. K. Sivaraman
	associated with fisheries and aquaculture in India	D. IVIAUTIUSUUATIA RAO	visaknapatnam	Dr. K. Ahamed Basha

List of on-going Research Projects



11	Monitoring of heavy metal content in finfish and shellfish along the coast of India and possible mitigation measures	Dr. Satyen Kumar Panda	Cochin	Dr. C. O. Mohan Dr. Pankaj Kishore
Minis	try of food Processing	(MOFPI)		
12	Upgradation of Food testing Laboratory at ICAR CIFT, Cochin MOFP(I)2020 Installation of Modern Analytical Instruments	Dr. C. N. Ravishankar	Cochin	Dr. Suseela Mathew Dr. Niladri Sekhar Chatterjee Dr. Satyen Kumar Panda
13	Design and development of hot air assisted continuous infrared drying system for high value fish and fishery products	Dr. Aniesrani Delfiya D. S.	Cochin	Dr. Manoj P. Samuel Dr. Murali S. Smt. Alfiya P. V. Shri Prashob K.*
14	Development of portable fish freshness assessment sensor	Dr. George Ninan	Cochin	Dr. Manoj P. Samuel Dr. Murali S. Dr. Anierani Delfiya D. S. Smt. Alfiya P. V. Dr. Murugadas V. Dr. Binsi P. K. Ms. Reshma Ramadas*
Food	Safety and Standards	Authority of India (F	SSAI)	
15	Natural Levels of Formaldehyde in Freshly Harvested Finfish and Shellfish Species	Dr. Satyen Kumar Panda	Cochin Mumbai	Dr. Laly S. J. Dr. Niladri Sekhar Chatterjee Ms. Priya E. R. Shri Ajeesh Kumar*
				Dr. Satyen Kumar Panda
16	FSSAI-National Reference Laboratory	Dr. C. N. Ravishankar	Cochin	Dr. Pankaj Kishore Dr. Anuj Kumar Dr. Devananda Uchoi Dr. V. Murugadas Dr. C. O. Mohan Ms. Priya E. R Dr. Ranjit Kumar Nadella Ms. Pranamya C. Haridas* Ms. Megha Sivadas*



17	NETSCOFAN-FTG	Dr. Satyen Kumar Panda	Cochin	Dr. Niladri Sekhar Chatterjee Dr. Pankaj Kishore Dr. Anuj Kumar Dr. Devananda Uchoi Dr. V. Murugadas Dr. C. O. Mohan Ms. Priya E. R. Dr. Ranjit Kumar Nadella Ms. Asha Mary Joseph* Shri Shamil Rafeeq*
Depa	rtment of Science and	Technology (DST)		
18	Development of a foldable smart live fish transportation system for distant trade of table fish	Dr. Parvathy U.	Cochin	Dr. Binsi P. K. Shri Sathish Kumar K. Dr. Murali S. Shri Vishnu R. Nair* Shri Jithin T. J.*
19	Determining seasonal and spatial occurrence of multiclass endocrine disrupting chemicals in the fishes, crustaceans and molluscs of the Vembanad urban estuary: risk assessment by an untargeted metabolomics approach	Dr. Niladri Sekhar Chatterjee	Cochin	
20	Green, clean and affordable energy for fishermen Community: Development of a multipurpose solar thermal conversion system with gasifier/ biomass heater backup	Dr. Murali S.	Cochin	Dr. Manoj P Samuel Dr. Aniesrani Delfiya D. S. Smt. Alfiya P. V. Dr. Sajesh V. K. Mr. Rijoy Thomas*
Coco	onut Development Boar	d (CDB)		
21	Improved coconut wood canoes for small scale fishing sector of southeast coast of India	Dr. Leela Edwin	Cochin	Dr. Muhamed Ashraf P. Dr. M. V. Baiju Dr. Manju Lekshmi N. Mrs. Leonna Angela Morris* Ms. Jesna Sudhakaran* Mr. Neeraj Kumar*



Prad	Pradhan Mantri Matsya Sampada Yojana, (PMMSY)			
22	National Surveillance programme for aquatic animal diseases	Dr. Murugadas V.	Cochin	Dr. Toms C. Joseph Dr. Ahamed K. Basha
Depa	rtment of Biotechnolog	ıy (DBT)		
23	Screening lytic phages from diverse marine and aquatic niche for controlling bacterial pathogens associated with aquaculture and post-harvest fish quality	Dr. B. Madhusudana Rao	Visakhapatnam	Dr. M. M. Prasad Dr. V. Murugadas Dr. G. K. Sivaraman Dr. S. Vishnuvinayagam Ms. R. Karthika* Shri B. Manikantha*
India	n National Centre for O	cean Information Se	ervices (ESSO-	INCOIS)
24	Validation and dissemination of Ocean state forecast advisories along Gujarat Coast	Dr. V. R. Madhu	Cochin Veraval	Dr. Prajith K. K. Dr. Chinnadurai S.
State Planning Board, Kerala				
25	Marine fishery in Kerala- households A study on evolution of policy, cost and earnings of fishing units and income of fisher	Dr. Suresh A.	Cochin	Dr. Leela Edwin Dr. Nikita Gopal Dr. Madhu V. R. Dr. Sajeev M. V. Dr. Sajesh V. K.





List of Personnel in ICAR-CIFT

(As on 31st December, 2021)

Managerial Personnel Director: Dr. C.N. Ravishankar

IIIII Heads of Division IIIII

Fishing Technology Division (I/c)
Fish Processing Division (I/c)
Biochemistry and Nutrition Division (I/c)
Extension Information & Statistics Division (I/c)
Quality Assurance and Management (I/c)
Engineering Division (I/c)
Microbiology, Fermentation & Biotechnology (I/c)

Visakhapatnam Research Centre Mumbai Research Centre Veraval Research Centre

Chief Administrative Officer Chief Finance & Accounts Officer

Dr. Leela Edwin. Principal Scientist
Dr. K. Asok Kumar, Principal Scientist
Dr. Suseela Mathew, Principal Scientist
Dr. A. K. Mohanty, Principal Scientist
Dr. A. A. Zynudheen, Principal Scientist
Dr. George Ninan, Principal Scientist
Dr. Toms C. Joseph, Principal Scientist

Dr. R. Raghu Prakash, Principal Scientist Smt. Greeshma S. S. Scientist

- Dr. Achich Kumar, Iba, Scientist
- Dr. Ashish Kumar Jha, Scientist
- : Shri Mahesh B. Khubdikar
- : Shri Prashant Kumar

SCIENTIFIC PERSONNEL

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- 1. Dr. T.V. Sankar
- 2. Dr. Saly N. Thomas
- 3. Dr. M. P. Remesan
- 4. Dr. Nikita Gopal
- 5. Dr. V. Geethalakshmi
- 6. Dr. Manoj P. Samuel (Deputation)
- 7. Dr. R. Anandan
- 8. Dr. J. Bindu
- 9. Dr. P. Muhamed Ashraf
- 10. Dr. S. Ashaletha
- 11. Dr. Femeena Hassan
- 12. Dr. A. Suresh
- 13. Dr. G. K. Sivaraman
- 14. Dr. V. R. Madhu
- 15. Dr. K. K. Asha
- 16. Dr. S. K. Panda

Senior Scientist

- 1. Dr. M.V. Baiju
- 2. Dr. M.V. Sajeev
- 3. Dr. C. O. Mohan
- 4. Dr. Pe. Jeyya Jeyanthi
- 5. Dr. P. K. Binsi

Scientist

- 1. Shri V. Radhakrishnan Nair
- 2. Dr. V. Chandrasekar
- 3. Dr. C. G. Joshy
- 4. Dr. V. Murugadas
- 5. Dr. K. Nagalakshmi
- 6. Dr. S. Visnuvinayagam
- 7. Dr. V. K. Sajesh
- 8. Dr. A. Jeyakumari
- 9. Dr. Remya S.



- 10. Dr. Laly S. J.
- 11. Dr. V. Renuka
- 12. Dr. Prajith K. K.
- 13. Dr. Niladri Sekhar Chatterjee
- 14. Dr. K. M. Sandhya
- 15. Dr. N. Rajendra Naik (Deputation)
- 16. Dr. N. Manju Lekshmi
- 17. Dr. U. Parvathy
- 18. Dr. Pankaj Kishore
- 19. Dr. Ranjit Kumar Nadella
- 20. Dr. K. Elavarasan
- 21. Dr. C. S. Tejpal
- 22. Dr. K. Rejula
- 23. Shri Paras Nath Jha

- 24. Smt. T. Muthulakshmi
- 25. Dr. R. K. Renjith
- 26. Smt. K. R. Sreelakshmi
- 27. Smt. E. R. Priya
- 28. Dr. Lekshmi R. G. Kumar
- 29. Dr. Devananda Uchoi
- 30. Shri K. Sathish Kumar
- 31. Dr. V. A. Minimol
- 32. Shri K. K. Anas
- 33. Shri S. EzhilNilavan
- 34. S. Dr. Murali
- 35. Dr. D. S. Aniesrani Delfiya
- 36. Smt. P. V. Alfiya

TECHNICAL PERSONNEL

Chief Technical Officer

- 1. Dr. B. Ganesan
- 2. Smt. P. K. Shyma

Assistant Chief Technical Officer

- 1. Dr. M. Baiju
- 2. Smt. T. Silaja
- 3. Dr. T. V. Bhaskaran
- 4. Smt. M. Rekha
- 5. Shri K. D. Jos
- 6. Dr. Santhosh Alex
- 7. Smt. K. K. Kala
- 8. Shri Sibasis Guha
- 9. Shri P.S. Babu
- 10. Shri G. Omanakuttan Nair
- 11. Dr. P. Shankar
- 12. Dr. Ancy Sebastian

Technical Officer

- 1. Shri V. N. Dileepkumar
- 2. Shri C. Subash Chandran Nair
- 3. Shri Aravind S. Kalangutkar
- 4. Shri P. S. Nobi
- 5. Smt. P. K. Geetha
- 6. Shri Sajith K. Jose
- 7. Shri P.V. Sajeevan

- 8. Smt. P. A. Jaya
- 9. Shri V. K. Siddique
- 10. Shri G. Gopakumar
- 11. Smt. N. Lekha
- 12. Shri K. S. Babu
- 13. Smt. Bindu Joseph
- 14. Shri T. P. Saju
- 15. Smt. N. C. Shyla
- 16. Shri P. D. Padmaraj
- 17. Shri P. S. Sunil Kumar
- 18. Shri N. Sunil
- 19. Shri K. V. Mohanan

Senior Technical Assistant

- 1. Shri C. K. Suresh
- 2. Shri P. A. Aneesh
- 3. Shri K. A. Noby Varghese
- 4. Shri V. Vipin Kumar
- 5. Smt. Vineetha Das
- 6. Shri T. Jijoy
- 7. Smt. V. Susmitha
- 8. Smt. P. Sruthi
- 9. Shri Rahul Ravindran
- 10. Smt. U. P. Prinetha
- 11. Shri Rakesh M. Raghavan
- 12. Dr. P. H. Dhiju Das



Technical Assistant

- 1. Shri K.C. Anish Kumar
- 2. Shri G. Vinod
- 3. Shri Ajith V. Chellappan

Senior Technician

- 1. Shri K. Ajeesh
- 2. Shri M. T. Udayakumar

- 3. Smt. Anu Mary Jose
- 4. Smt. G. Archana
- 5. Smt. P. J. Mary
- 6. Shri P. Suresh
- 7. Smt. K. Reshmi
- 8. Shri V. N. Sreejith

ADMINISTRATIVE PERSONNEL

Deputy Director (Official Language)

1. Dr. J. Renuka

Senior Administrative Officer

1. Shri W. Sreenivasa Bhat

Administrative Officer

1. Shri R. N. Subramanian

Assistant Administrative Officer

- 1. Shri K. B. Sabukuttan
- 2. Shri M. N. Vinodh Kumar
- 3. Smt. V. K. Raji

Private Secretary

- 1. Shri R. D. Goswami
- 2. Smt. Anitha K. John

Assistant

- 1. Shri K. Das
- 2. Smt. G. Surya
- 3. Smt. Nilina Elais
- 4. Smt. N. R. Akhila
- 5. Smt. A. R. Raji
- 6. Shri P. Mani
- 7. Smt. Jaya Das
- 8. Smt. E. Jyothilakshmy
- 9. Smt. P. R. Mini
- 10. Shri T. N. Shaji
- 11. Shri Santhosh Mohan
- 12. Smt. Shiji John
- 13. Shri T. R. Syam Prasad
- 14. Shri P. G. David

Upper Division Clerk

- 1. Smt. K. V. Suseela
- 2. Shri T. D. Bijoy
- 3. Smt. K. S. Sobha
- 4. Smt. Subin George
- 5. Smt. Suni Surendran
- 6. Shri Deu Umesh Aroskar
- 7. Shri Rajeev P.
- 8. Shri Gouri Sankar Sahoo

Lower Division Clerk

- 1. Kum. N. Arachana
- 2. Shri S. S. Subeesh
- 3. Shri P. M. Rizwan
- 4. Shri K. S. Ajith
- 5. Shri K. Thinakaran
- 6. Shri P. N. Nikhil Das

Stenographer Grade-III

1. Shri Sachin Gautam

Supporting Personnel

Skilled Support Staff

- 1. Shri K. K. Karthikeyan
- 2. Smt. P. T. Mary Vinitha
- 3. Shri O. P. Radhakrishnan
- 4. Shri S. N. Dash
- 5. Shri P. Raghavan
- 6. Shri T. M. Balan
- 7. Shri V. Deepak Vin
- 8. Shri K. R. Rajasaravanan
- 9. Shri A. Vinod
- 10. Smt. M. G. Soudamini

Auxiliary Staff

1. Shri M. V. Rajan





Visakhapatnam Research Centre

Scientific Personnel

Principal Scientist

- 1. Dr. U. Sreedhar
- 2. Dr. B. Madhusudana Rao
- 3. Dr. Sullip Kumar Majhi

Scientist

- 1. Dr. P. Viji
- 2. Dr. Jesmi Debbarma
- 3. Shri Gaihiamngam Kamei
- 4. Shri K. Ahamed Basha

Technical Personnel

Chief Technical Officer

1. Dr. Moka Swamy Kumar

Technical Officer

- 1. Shri Himansu Sekhar Bag
- 2. Shri Ashok Kumar Naik
- 3. Smt. Tessy Francis

Senior Technical Assistant

1. Shri Meddi Prasanna Kumar

Senior Technician

1. Shri G. Bhushanam

Administrative Personnel

Upper Division Clerk

- 1. Shri Amit Vengraj (Deputation)
- 2. Shri Ramesh Mirdha

Lower Division Clerk

- 1. Shri M. Sreevishnu Prabhakar Rao
- 2. Smt. Nalla Naveena

Supporting Personnel

Skilled Support Staff

- 1. Shri Triloknath Banchoor
- 2. Shri Sanyasi Ganik
- 3. Smt. Gyana Netri Nag
- 4. Shri S. K. Mehar
- 5. Shri Kedar Meher
- 6. Shri Lalit Oram

Veraval Research Centre Scientific Personnel

Scientist

- 1. Dr. Anupama T. K.
- 2. Shri Sreejith S.
- 3. Dr. Sarika K.
- 4. Shri Chinnadurai Shunmugavel

Technical Personnel

- Senior Technical Assistant
- 1. Shri Sida Hanif Ummer Bhai
- 2. Shri G. Kingsely

Technical Assistant

- 1. Smt. Nimmy S. Kumar
- 2. Shri Ranjan Singh

Senior Technician

- 1. Shri Jitendra Bachubhai Malmadi
- 2. Shri Kriplani Yogeshkumar Dharamdas

Administrative Personnel

Assistant Administrative Officer

1. Smt. K. Renuka

Assistant

1. Shri M. Arockia Shaji

Lower Division Clerk

1. Smt. S. Joshna

2. Shri T. V. Anish

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Supporting Personnel

Skilled Support Staff

- 1. Shri D. Khoda Viram
- 2. Shri Ashwinkumar Moghanlal Vala
- 3. Shri Makwana Krasan Kana
- 4. Smt. Pushpaben P. Chudasama

- 5. Shri Narsinh K. Masani
- 6. Shri P. Ramakrishna
- 7. Shri Rotash

Auxiliary Staff

1. Smt. Veena Sreedhar Narkar

Mumbai Research Centre

Scientific Personnel

Principal Scientist

1. Dr. L. Narasimhamurthy (Deputation)

Scientist

- 1. Dr. Abhay Kumar
- 2. Dr. Rehna Raj

Technical Personnel

Chief Technical Officer

- 1. Smt. Sangeetha D. Gaikwad
- 2. Smt. Thriven Gopal Adiga

Senior Technical Assistant

1. Smt. Priyanka Ajay Nakhawa

Technical Assistant

- 1 Smt. G. Megha
- 2. Shri Thulsiram A. Waghmare

Administrative Personnel

Assistant

1. Shri Avinash N. Agawane

Lower Division Clerk

2. Smt. C. G. Bhavaymol

Supporting Personnel

Skilled Support Staff

1. Smt. Priyanka P. Bait





PAPERS PUBLISHED IN REFERRED JOURNALS

Ajeeshkumar, K. K., Aneesh, P. A., Navaneethan, R., Suseela Mathew, Ravishankar, C. N. and Soottawat Benjakul (2021) Advancements in liposome technology: Preparation techniques and applications in food, functional foods, and bioactive delivery: A review. Compr. Rev. Food Sci. Food Saf. 20(2): 1280-1306. http://krishi.icar.gov.in/jspui/ handle/123456789/64483

Ajeeshkumar, K. K., Vishnu, K. V., Bineesh, K. K., Suseela Mathew, Sankar, T. V. and Asha, K. K. (2021) Macromineral and heavy metal profiles of selected deep-sea fish from the Kochi coast of the Arabian Sea, India. Mar. Pollut. Bull. 167: 112275. http://krishi.icar.gov.in/ jspui/handle/123456789/61057

Ajimoon Nissa, Manju Lekshmi, N., Manoj Kumar, B., Sanjay Kumar Das, E. P., Anand Goud (2021) Structural and Operational Aspects of Fishing Traps of Meghalaya, North East India. Fish. Technol. 58 (3): 147-154. http://krishi.icar.gov.in/jspui/ handle/123456789/69953

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Aniesrani Delfiya, D. S., Prashob, K., Murali, S., Alfiya, P. V., Manoj P. Samuel and Pandiselvam, R. (2021) Drying kinetics of food materials in infrared radiation drying: A review. J. Food Process Engg. http://krishi.icar.gov.in/jspui/ handle/123456789/61058 Aniesrani Delfiya, D. S., Sneha, R., Prashob, K., Murali, S., Alfiya, P. V. and Manoj P. Samuel (2021) Hot airassisted continuous infrared dryer for anchovy fish drying. J. Food Process Engg. e13824 http://krishi.icar.gov. in/jspui/handle/123456789/69951

Arathy Ashok, Sreejith, S., Diana Benjamin, Bindu, J. and Nikita Gopal (2021) Ethnic Foods and Food based Traditional Knowledge of Fishing community in Kerala, India. Fish. Technol. 58 (1): 48-52. http://krishi.icar. gov.in/jspui/handle/123456789/60370

Asha, K. K., Suseela Mathew, Prasad, M. M. and Ravishankar, C. N. (2021) Iron-Enriched Fish Powder Improved Haemoglobin Levels in Adolescent Girls of West Jaintia Hills District of Meghalaya, India. Biol. Trace Elem. Res. http://krishi.icar.gov.in/jspui/ handle/123456789/60388

Ashok, K. C., Sriraksha, M. S. and Ravishankar, C. N. (2021) Sustainability of emerging green non-thermal technologies in the food industry with food safety perspective: A review. LWT-Food Sci. & Technol. 151: 112140. http://krishi.icar.gov. in/jspui/handle/123456789/63712

Babu, P. S., Sudheer, K. P., Bindu, J. and Mohan, C. O. (2021) Effect of thermal processing on quality of tender jackfruit in tinfree-steel cans. J. Food Sci & Tech. https://doi.org/10.1007/s13197-021-05218-x http://krishi.icar.gov.in/jspui/handle/123456789/71361

Balakrishnan, M., Gayathiri, S., Preetha, P., Pandiselvam, R., Jeevarathinam, G., Aniesrani Delfiya, D. S. and Anjineyulu Kothakota (2021) Microencapsulation of bixin pigment by spray drying: Evaluation of characteristics. LWT-Food Sci. & Technol. 145: 111343. http://krishi.icar. gov.in/jspui/handle/123456789/64479

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The ICAR-Central Institute of Fisheries Technology, Cochin, has been awarded the prestigious Official Language Shield of the Department of Official Language, Ministry of Home Affairs, Government of India. The prestigious Official Language Shield has been awarded to ICAR-Central Institute of Fisheries Technology, Cochin for first position for the best performance and Implementation of Official Language in the South Western Region of India for the year 2018-19 in South and South West Regional Official Language Conference held on 04 December 2021 at Dr. Homi Bhabha Convention Centre, Nuclear Fuel Complex (NFC), Hyderabad (Telangana). Dr. J. Renuka, Deputy Director (OL) received this prestigious Official Language Shield and Certificate on behalf of Dr. Ravi Shankar C.N., Director of ICAR-CIFT from Dr. Meenakshi Jolly, Joint Secretary, Department of Official Language, Ministry of Home Affairs, Government of India and Dr. Dinesh Srivastava, Chairman and Chief Executive, Nuclear Fuel Complex (NFC), Hyderabad.

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भारत







